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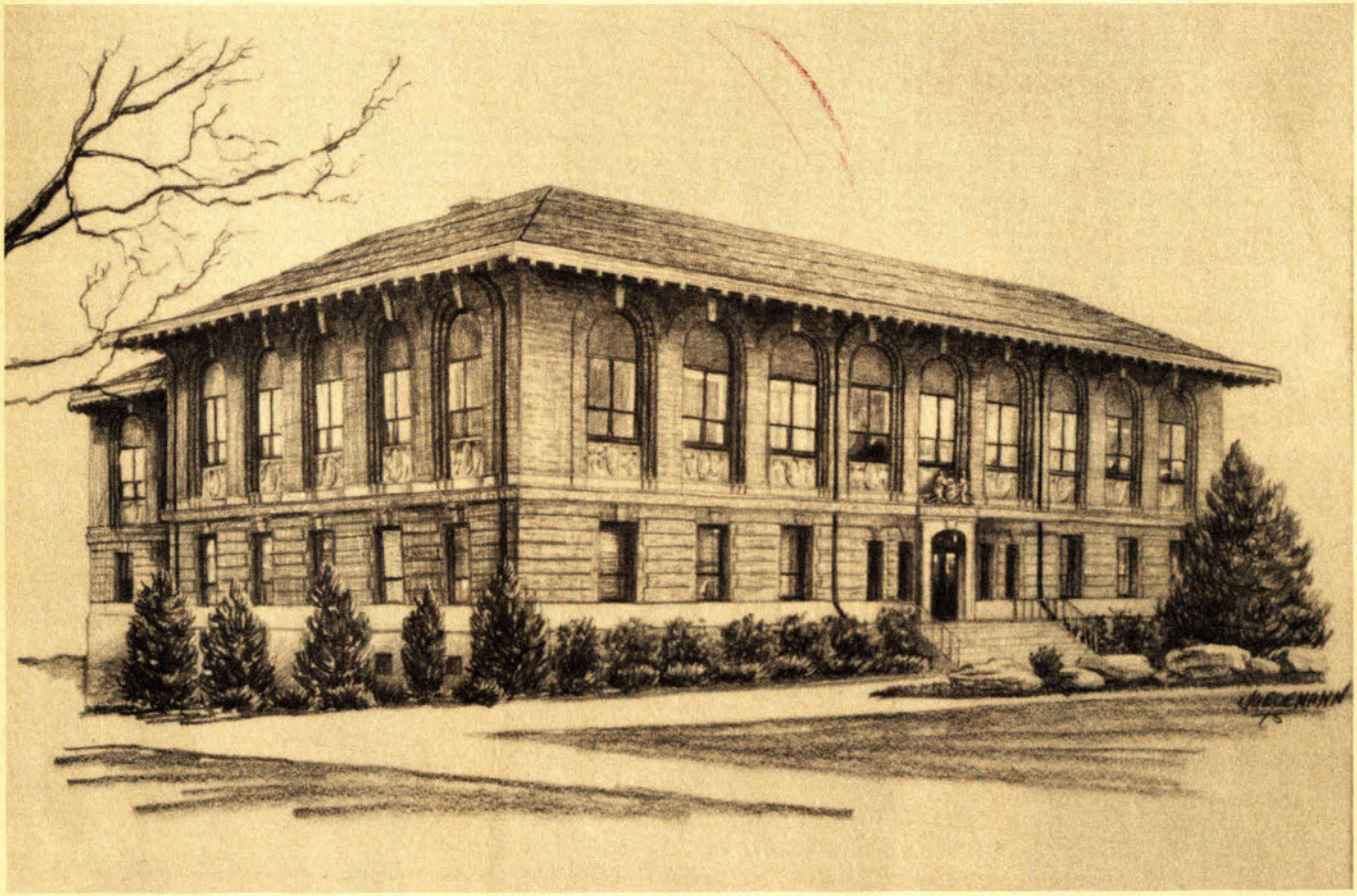
University of Missouri--Rolla Self-Study for North Central Association Accreditation

University of Missouri--Rolla

UNIVERSITY OF MISSOURI-ROLLA



Parker Hall

VOLUME 1: SELF-STUDY

May 1978

SELF-STUDY

for

NORTH CENTRAL ASSOCIATION ACCREDITATION

University of Missouri-Rolla
Rolla, Missouri
65401

ABSTRACT

The administrators of the University of Missouri-Rolla in preparing this self-study in preparation for the visit of the North Central Association team have generally followed the recommended format of the Handbook on Accreditation. The Contents provide an insight into the subjects treated, and the Conclusions speak to the general health of the institution.

Volume II of the self-study will be formed from NCA Basic Institutional Data forms and will be available by August 1, 1978.

Materials marked as "appendix" within the text will be supplied to the visiting team upon its arrival on campus. Other information, as suggested by the Handbook on Accreditation, accompanies this document.

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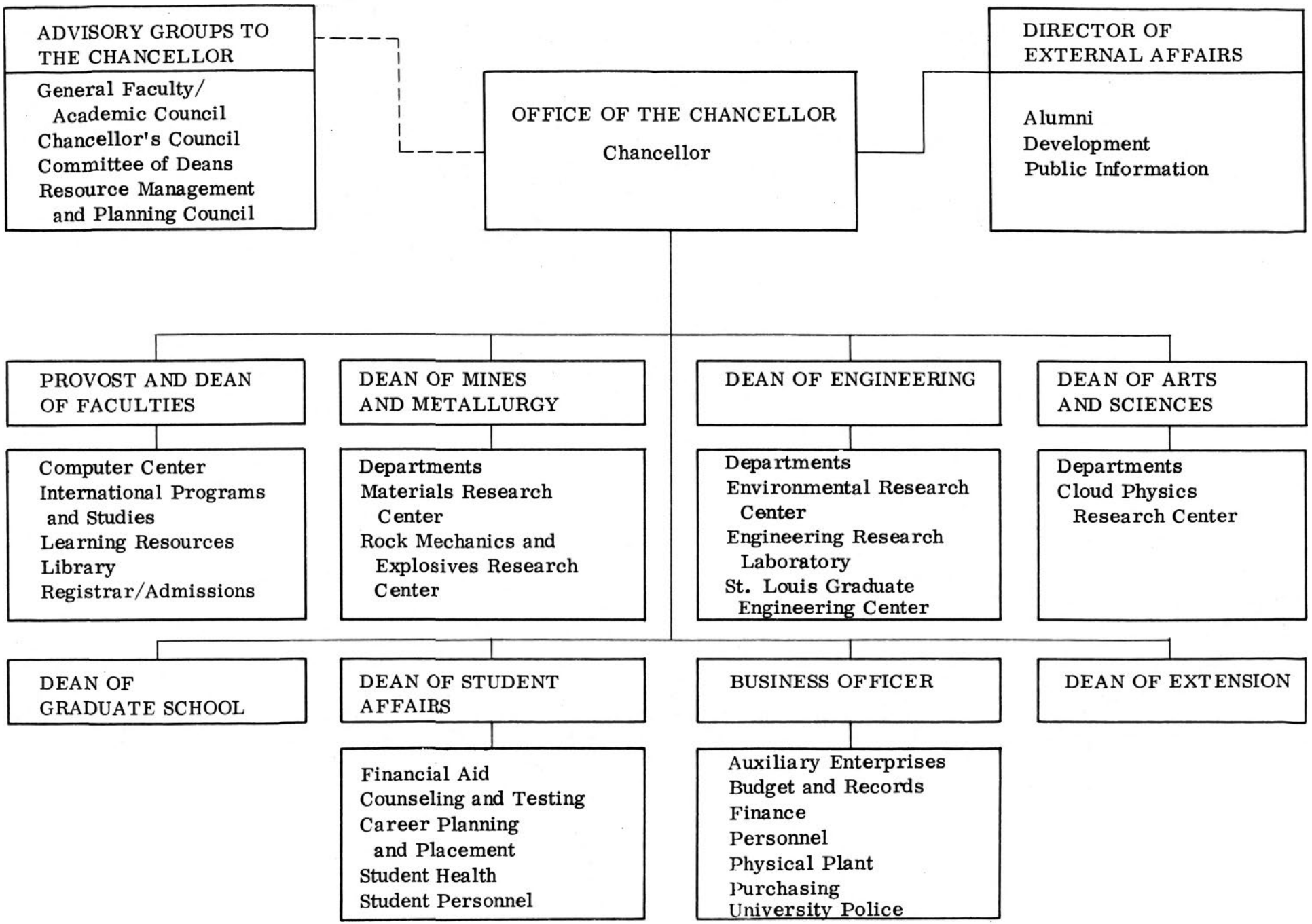
APPENDICES

The above are documents specifically mentioned in the self-study. Other information including fiscal reports and budgets will be added to the appendix file as their usefulness becomes apparent to the participating UMR individuals.

UNIVERSITY OF MISSOURI - ROLLA



INTRODUCTION

At its meeting on July 28, 1972, the North Central Association of Colleges and Secondary Schools voted to grant accreditation to the University of Missouri-Rolla (UMR) as an "operationally separate" campus of the University offering doctoral degree level programs. This initial independent accreditation for UMR stipulated that a visit be made in five years with particular attention given to the doctoral programs. Prior to this accreditation, UMR had been accredited, since 1913, as the University of Missouri School of Mines and Metallurgy, an integral part of the University of Missouri though geographically separated from it. With the exception of personnel changes, the organization and governance of the University of Missouri have not changed since the previous evaluation.

The University of Missouri-Rolla was established as the University of Missouri School of Mines and Metallurgy in 1870 as a part of Missouri's land-grant educational effort in the mechanic arts to provide technical support for the mining and construction industries of the state. Its initial specialization in engineering has continued to the present. In 1963, the University of Missouri became one university with four campuses located in Columbia, Kansas City, Rolla, and St. Louis. This organizational structure has permitted the Rolla campus to develop more rapidly and efficiently in the past 15 years than it would have otherwise. From its inception, the one university concept has proceeded with an increasing coordination of educational programs, the centralization of certain services and offices needed by each of the four campuses, and an increasing spirit of cooperation among and between the campuses. At the same time, the Rolla campus has maintained much of its previous identity and reputation established prior to the organization of the University of Missouri system.

As provided by the State constitution, the University of Missouri* is governed by a nine-member Board of Curators whose members are appointed by the Governor and confirmed by the Senate. The President of the University, who is appointed by the Board of Curators, directs and coordinates the programs of all four campuses with the assistance of a central administrative staff in such areas as administration, finance, business management, academic affairs, research, extension, and public information.

As a land-grant university, the Rolla campus of the University of Missouri carries on three essential functions: teaching, research, and public service. From its founding in 1870, UMR has attempted to meet the existing technological, economic, and related social needs of the State of Missouri. All programs and operations at UMR are under the direction of the Chancellor, who administers the campus within the policies and guidelines established by the President and the Board of Curators. In the fall of 1974, the campus central administration was reorganized by the incoming Chancellor to include a Vice Chancellor and a Provost and Dean of Faculties; these along with the naming of a Dean of Student Services are the only major organizational changes in the administration since the 1972 accreditation, however it is questionable whether the position of Vice Chancellor will be continued beyond July 1978.

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*Supplementary materials appended to this self-study are contained in a separate appendix file.

UMR has three schools, one college, and one division. Each is headed by a dean. They are the School of Engineering, the School of Mines and Metallurgy, the Graduate School, the College of Arts and Sciences, and the Extension and Continuing Education Division. Each of the present deans is a permanent appointee. In addition, the campus has three major research centers. Each is headed by a director, who is also a permanent appointee. The campus has various academic support services and programs, such as a Minority Engineering Program, a Women in Engineering Program, a Cooperative Education Program, and a Cooperative Training Program; these are in addition to such facilities and offices as the library, registrar and admissions, and counseling.

All the principal administrative offices at UMR are normally occupied by permanent appointees, but presently the Office of the Chancellor is filled by an interim appointee who has held the position since January 1, 1977.

The role of the faculty in policy formulation and resource allocation has been substantially increased and systematized in the past few years by the functioning of the Academic Council as representative of the general faculty, the recent establishment of a Resources Management and Planning Council, and the creation of two new representative committees. The Academic Council consists of 42 faculty, six administrators, and seven nonvoting students; the faculty are elected on a representative basis by each department. This council has matured and strengthened itself in the past several years and takes the initiative in proposing action on various types of problems affecting both the faculty and the administration as well as the nonacademic staff. For example, it considers modification of fringe benefits, promotion and tenure guidelines and procedures, and grievance procedures. The membership of the Resources Management and Planning Council includes the chairman and chairman elect of the Academic Council and the chairman of the Academic Council Budgetary Affairs Committee. This committee evaluates central administration guidelines and recommends guidelines and priorities for the Campus Operating Budget, program changes dictated by redistribution, increases or decreases of available resources, and guidelines and priorities for the Campus Legislative Budget Request. It also prepares budgetary studies and develops such budgetary plans and priorities as directed by the Chancellor. The two committees established by the Chancellor are the Chancellor's Council and the Administrative Council. The Chancellor's Council is a small advisory body, which includes among others the deans and the chairman of the Academic Council. The Administrative Council includes all deans, directors, department chairmen, representatives of the Academic Council, and student representatives. There is a free interchange of information and ideas among the members of these several groups. There has been a special effort made by the present administrators to keep the Academic Council fully informed of both campus planning and fiscal matters. Other older representative groups that make recommendations to the Chancellor include the Committee of Deans, the Committee of Department Chairmen, and the Graduate Faculty.

In addition to the increased role of the faculty in policy formulation and resource allocation, a concerted effort is being made to decentralize the decision-making and operational processes from the campus central administration and to establish a meaningful degree of autonomy for its division administrators, especially the school and college

deans. Therefore, not only does the present administrative structure and method of operation allow broad input into fiscal and planning matters from all sections of the campus, but the responsibility and authority for the implementation of agreed upon procedures is placed at the lowest possible level. In some respects, the decentralization of authority and operations and the provision for campus participation in planning matters are the major accomplishments of the past six years.

The campus administrators recognize that growth funds and, in some instances, even program maintenance funds may be limited in the future and that internal reallocations will be a primary source for program improvement, program growth, and maintenance of the quality of existing programs. Studies have therefore been undertaken to achieve necessary internal reallocations, which at times means program reductions in selected areas in order to achieve the goals of the campus. Examples of this type of reallocation are the Board approved Ph.D. degree in Computer Science and a B.S. degree in Life Sciences. The first was funded from reallocation of resources and the second will be starting in the fall of 1978. On the other hand, the campus has chosen not to introduce two other new degree programs, because in priority they cannot be funded.

In a similar vein, a standard operating procedure has been established which requires that all positions and dollars freed by death, departure, or retirement be reviewed by either the Provost and Dean of Faculties or the Business Officer, as appropriate. These resources are reallocated or withdrawn to a central campus resource only after proper review. In addition, this year, a contingency fund has been set up. This fund is available to the Provost or Business Officer to meet demonstrated inequities in academic programs and physical plant needs. The administrators have also adopted a policy of returning to the academic units all grant salary and wage release dollars and all sabbatical and leave of absence dollars so that they can be used by the units for their program needs. This latter action has provided a great deal of academic flexibility at the operational unit level.

Careful consideration has been given to the areas that concerned the visiting committee of the North Central in 1971, and each concern noted in its report* is addressed in the main body of this self-study. In point of fact, those who are responsible have been working on these concerns for the past six years, beginning with a report by the Academic Personnel Committee of the Academic Council in 1973 on the evaluation of administrative offices at UMR. This report, which deals with administrative structure, delegation of authority, the identification of goals, and administrative processes, includes suggested corrections for each. In its summary, the previous visitation report identified five campus needs: 1) a need to change decision-making processes on the Rolla campus and a willingness to accept the responsibility for decisions, 2) a need for the Chancellor to delegate responsibilities instead of carrying the whole administrative load, 3) a need to improve communications regarding campus policies, 4) a need for better communication between faculty and students, and 5) a need to improve the quality of the graduate students.

*Appendix

Without question all of these needs have been considered, new approaches have been initiated and in most cases retained, and, certainly, the quality of the graduate students has been markedly improved. Some of the needs, however, must be considered in view of the vastly different campus climates that existed then and now. USA no longer has a military operation in Viet Nam. The central administration has changed as has the campus, and decision-making and the assumption of responsibility are at a new high quality wise as a result of the change. Students and faculty have always related well on campus, and concern about a student-faculty communication problem in 1972 was directed more toward the fact that the campus might be overestimating the students' "complacency" rather than toward evidence of a lack of very real and deep communication. The campus is keenly proud of the academic and humanitarian accomplishments of its students. Student advisement and minority programs are of continuing high priority, and evidence cited in the Graduate School's report documents measurable improvements in these areas.

The administrators of the University of Missouri and its Rolla campus have had an unusual and valuable process of self-study underway since December of 1971 when the President of the University announced that a landmark "self-study" of the total University was to be undertaken. It was intended that the study would provide the President and the Board of Curators with all the information needed by them to determine the role of each campus within the University and the scope of its educational programs. Likewise, it would provide to each campus a framework for development and planning. This "self-study", commonly referred to as "Role and Scope", was conducted by the Vice President of Academic Affairs and is the basis for the preparation of this self-study.

The Role and Scope study, which produced the Academic Plan*, Part I (Degree Programs), Part II (Extension), and Part III (Research), required two and one-half years to complete. It has been blended into this self-study for North Central. The campus community participated fully in the development of the Role and Scope plan and proceeded during the plan's evolvement and since its publication to develop an academic program in consonance with its missions and goals.

This self-study was prepared under the auspices of an ad hoc committee whose members as of April 1978 were: Dean Adrian H. Daane, College of Arts and Sciences; Dean James E. Halligan, School of Engineering; Dean Theodore J. Planje, School of Mines and Metallurgy; Dean G. Edwin Lorey, Extension and Continuing Education Division; Dean Robert H. McFarland, Graduate School; Dean Paul E. Ponder, Student Affairs; Mr. Joseph D. Wollard, Business Officer; Mr. Robert B. Lewis, Admissions and Registrar; Mr. Ronald G. Bohley, Librarian; Dr. Wayne C. Cogell, Academic Council; Mr. Steven J. Treis, Student Council; and Mr. Thomas J. Kvale, Graduate Student Association. Interim Chancellor Pogue and Dean McFarland shared the responsibility of chairing the committee. Mr. Neil K. Smith, Director of Institutional Studies, and Mr. John W. Koenig, Technical Editor in the Research Office, provided special expertise in preparing the final copy.

The self-study is divided into the following sections: 1) general information on the

*Appendix

organization, administration, and governance of the University, 2) the educational programs offered by the academic divisions, 3) principal resources and supporting services, and 4) a description of the activities of the Centers and Institutes. Each section is organized within the framework of the following topics: Missions and Goals, Governance and Decision-Making, Achievement of Objectives, Carrying Out of Institutional Goals Through Institutional Programs, and Resources and Support Services.

UNIVERSITY SYSTEM

Founded in 1839, the University of Missouri was established in the city of Columbia as the first state university west of the Mississippi River. In 1870, it was designated a land-grant university, and the School of Mines and Metallurgy was established at Rolla with a director reporting to the president at Columbia. In 1963, the University became a multicampus system as the School of Mines became the University of Missouri-Rolla and two additional campuses were added. The former municipal University of Kansas City became the new University of Missouri-Kansas City, and a new campus was established in St. Louis as the University of Missouri-St. Louis. Each of the four campuses is headed by a chancellor, who reports to the President of the University.

Today, the enrollment on the University's four campuses is just over 50,000 students, and an additional 233,000 persons are served through formal educational course work of the Extension division. The University is both the state's land-grant institution and a prime urban university; it provides the only public educational programs in the professions of medicine, law, and dentistry. It is unique in Missouri public education in its research and doctoral programs. The present organizational, governance, and fiscal structure is that of a single university with four campuses, each campus having unique characteristics and a great deal of local autonomy to carry out its particular functions within the total university framework. The North Central Association has continuously accredited the University since the Columbia campus first received accreditation in 1913.

Mission and Goals

In January 1971, the then President Ratchford invited the chancellors, the deans of faculties, campus faculty leaders, and central administration staff officers to join him in initiating a project of institutional reappraisal. This project was designed to reexamine the University in four important areas: mission, program, resources, organization and governance. By September 1971, the document "Preface to Decision" was published. It set out the University community's view of these four areas as a starting point for the reappraisal process. In particular, the mission of the University was described as encompassing the two basic goals of enhancing human potential and focusing attention on the legitimate concerns of society.

While the University's mission certainly includes response to local and state needs, its outreach often must extend beyond state boundaries, and it must serve as an educational resource for the Nation. Particularly in the graduate and professional areas, the University of Missouri is one of the major research and graduate centers of the country and is a member of the Association of American Universities. Through the traditional areas of teaching, research, and service, the University thus seeks to serve the State and beyond by enhancing human potential and contributing to the solution of societal problems.

In the fall of 1971, the University's institutional reappraisal process continued with consideration of the following important tasks:

1. Redefinement of the role and scope of each campus and University-wide unit within the broad University mission statement discussed above.

2. Assessment of all University academic programs to determine strengths and weaknesses.

3. Development and improvement of an administrative structure for the University.

These self-examination projects were conducted simultaneously with the assessment of strengths and weaknesses being an important factor in the final definition of role and scope of each unit of the University.

To accomplish this assessment, central to the reappraisal process, evaluation teams visited the University during 1972-73. These teams, composed of distinguished individuals from outside the University, were asked to examine academic and support programs to assess their strengths and weaknesses and to suggest changes in them in light of the University's mission and resources. There were in all 30 teams covering the following areas:

Agriculture, Home Economics, and Forestry
Anthropology, Geography, and Sociology
Biological Sciences
Business and Public Administration
Communication Arts
Economics and Political Science
Education
Engineering
English and Foreign Languages
Extension: Business, Industry, and Labor
Extension: Community Public Sector and Quality of Environment
Extension: Food and Fiber
Extension: Quality of Living
Extension: Continuing Education for Professionals
Extension: Comprehensive
Fine Arts
History and Philosophy
Law
Library and Informational Sciences
Learning Resources (Computers, Broadcast Media, and Electronic Audiovisual Resources, Library and Electronic Audiovisual Media)
Mathematical Sciences
Musicology and Art History
Physical Sciences

Professional Health Sciences
Psychology
Administration of Justice
Research
Development
Business
Finance

The reports of these teams provided a comprehensive, detailed look at academic and support programs throughout the University. Team recommendations, including assessments of strengths and weaknesses in each program area on each campus, played an important role in the final development of the University's Academic Plan for 1975-85. This series of documents was the culmination of the entire reappraisal process. During the three years of 1971 through 1974, the first part of the University's Academic Plan (Degree Programs) was prepared. This portion of the plan, which sets the major framework for each campus's academic development, delineates the scope of academic program development of each campus during the ten-year period and indicates priorities for program support. The second and third portions of the plan, dealing with research and extension, were finished in 1975-76.

As a part of the resulting Academic Plan, the individual roles of the campuses were more carefully defined, so as to carry out the University's overall mission and yet recognize the diverse locations, strengths, and local needs of the individual campuses.

These missions and goals are continually reexamined, but the framework established by the academic planning process has focused the University's efforts and resources in a way that would not have been possible otherwise.

Governance and Decision-Making

The University of Missouri is a constitutionally established function of the State of Missouri. The governance of the University is vested by the Constitution in a nine-member Board of Curators appointed by the Governor by and with the advice and consent of the Senate. This constitutional autonomy given to the Board has been an important factor in the University's ability to determine how best it can meet its missions and goals of service to the State.

The Board has delegated to the President and to the faculties a great deal of authority and responsibility for the decision-making essential in an academic institution. For example, the Board itself does not review or act on promotions or the granting of tenure; it does not act on the hiring of any personnel except major administrative officers, including chancellors, vice presidents, and, of course, the President, himself. Such matters as curricular authority, admissions standards, and degree requirements are vested in the faculties, except that new degree programs require Board approval.

The President of the University is its chief executive and academic officer. He and his staff are responsible for maximizing the advantages of a multicampus university by

encouraging diversity, enhancing specialization, and promoting cooperation. With the vice presidents, of which there are six: Administration, Academic Affairs, Administrative Affairs, Business Management, Research, and Extension, the President serves as the primary focus for the external relations of the University and establishes with input from the campuses the policies and guidelines for the operation of all campuses under direction from the Board of Curators. The President's staff coordinates program efforts when more than one campus is involved and determines resource allocations to the respective campuses after the legislative appropriation of State funds. The central administration staff monitors programs and activities and advises the units of the results and administers directly a few functions, such as the Research Reactor and Statewide Extension, which relate to all campuses of the University.

The President has delegated to the chancellors full responsibility and authority to carry out campus missions and to administer all programs except the few that are administered centrally. While the Board of Curators clearly looks to the President as the chief officer of the University, the chancellors are involved in all system policy decisions, budget decisions, and planning operations through specific mechanisms as described below. The President and his staff are committed to continue to clarify and improve administrative arrangements and decision-making channels between the campuses, the central administration, and the Board of Curators.

The University Cabinet is the central University policy council. It consists of the chancellors, the vice presidents, the General Counsel, and the chairman of the Intercampus Faculty Council. It is chaired by the President. It meets monthly to review a number of policy issues, including budget guidelines. A new Resource Council, chaired by the Vice President for Administrative Affairs, with the Vice President for Academic Affairs and the chief business officer and chief academic officer of each campus as representatives, will increase campus input into the details of the budget-building and allocation process.

The Intercampus Faculty Council is an important mechanism for providing direct faculty advice to the President. The Council consists of 12 members, three from each campus, who are elected according to procedures established by the faculty governance groups on the individual campuses. The Council serves as a liaison committee to make available to the President and his staff representative views and opinions of members of the several campus faculties on such problems as the President wishes to discuss and to serve as a medium for communication between the President and his staff and representatives of the faculties. The group normally meets monthly with the President, the Vice President for Academic Affairs, and the Vice President for Administration. This group is consulted by the President on matters of budget, academic planning, major policy, and general university problems.

There are many other groups, both standing and ad hoc, which reflect the interplay of central administration and campuses in the University decision-making. For instance, the chief academic officers from each of the campuses (the Provosts Group) meet monthly with the Vice President for Academic Affairs to develop recommendations to the Cabinet, to dis-

cuss problems of mutual concern to the academic officers, and to serve as a communications link between the campuses. There is a similar group in the business area. The graduate deans meet with both the Vice President for Academic Affairs and the Vice President for Research to discuss matters related to graduate education and research administration.

The provosts and the graduate deans serve as the system review groups for new degree program proposals from the campuses, with the provosts serving this function for undergraduate and professional programs, and the graduate deans serving as a review mechanism for graduate programs. These groups individually have access to the complete proposal (and supporting materials), discuss them in a preliminary meeting, and normally conduct a site visit to the campus proposing the program to discuss strengths and weaknesses with faculty and administrators. They then prepare a summary recommendation, which is transmitted by the Vice President for Academic Affairs to the Cabinet when it considers the proposed program.

The Committee on Financial Exigency Policies is a good example of an ad hoc group created to provide broad input into the development of University policy. The group, consisting of faculty and academic administrators from all four campuses, was formed in 1976 to develop recommended institutional policy in the case of financial exigency. All campuses participate fully with representatives providing feedback mechanism to local faculty groups. The report of this group is taken to the Cabinet for consideration and review before submission to the Board of Curators. Similar groups have been effective in developing policy statements in other areas.

As has been mentioned earlier, new academic programs are reviewed at the central administration level before a recommendation is taken to the Board of Curators. This review ensures the consonance of campus and University objectives as well as the quality of the programs and financial support for them. In this way, the central administration seeks to ensure that the University's objectives are achieved.

In addition to the approval of new programs, the administrators of the University have established a policy for program review on a continuing basis as a way of monitoring the achievement of institutional objectives on the individual campuses. Such reviews were initially a part of the institutional appraisal process and have been continued on a regular basis. Reviews are primarily the responsibility of the campuses, but overall policy is set by the Provosts Group with the Vice President for Academic Affairs. This group also considers proposed campus programs to be reviewed, discusses the results of program reviews, and may make recommendations through the Vice President for Academic Affairs to the President. The University is committed to this continuing kind of monitoring in all areas of University activities, following the institutional reappraisal that culminated in the Academic Plan.

An important ingredient in the governance of the University was introduced in July of 1974, when the Coordinating Board for Higher Education was established by the State. Previously, there had existed a Missouri Commission on Higher Education, but its role was limited

and its powers advisory only. The new Coordinating Board is specifically charged by statute with the responsibility for approval of new degree programs and for the development of budget guidelines for each of the public institutions of higher education. The Board is a lay board with no professional educators. Its members are appointed by the Governor by and with the advice and consent of the Senate. It does not have responsibility for management in any way, but through program approval authority and budget-recommending authority it has become, as in many other states, a significant factor in the life and management of the University.

The Coordinating Board is in the process of completing a new Master Plan for Higher Education in Missouri. The plan reaffirms the traditional role of the University as the sole public institution offering doctoral work and professional programs.

The Board of Curators of the University has worked with the Coordinating Board and has cooperated with its policies and procedures in academic and fiscal matters but has reserved to itself the right to continue to make its own budget presentation directly to the legislature and the right to make its own internal governance decisions as befits a constitutionally autonomous agent of the State.

Institutional Programs

Instructional Programs.

The University's instructional programs are designed to reflect its land-grant and urban mission to provide a wide spectrum of baccalaureate programs, professional programs, and the only doctoral programs in public institutions in the State of Missouri. The University's Academic Plan sets forth the structure of instructional programs on each of the campuses in the light of the overall University mission and specific campus responsibilities within that mission.

It should also be mentioned that the University has exchange agreements with the Board of Regents in Kansas and the Board of Regents of the University of Nebraska to provide for access by Missouri students to certain programs not offered by the University. For example, many Missouri students are enrolled in architectural programs at the University of Kansas and Kansas State University and pay in-state tuition only under the exchange agreement. Similarly, Missouri students can attend the University of Nebraska on an in-state tuition basis to take their fine program in actuarial science. Kansas and Nebraska, on the other hand, send students to the University of Missouri for dentistry, veterinary medicine, forestry, minerals engineering, and other programs not available in those states. Through such arrangements, the University is able to extend the educational opportunities, which it offers to Missouri students, at less cost to the State and enabling the University to concentrate its resources on fewer programs.

Research.

As with the instructional programs, the University's recent academic planning process

takes into consideration the role of research in the University and the various areas in which research effort is being conducted and makes projections through the next five years. Research has a high priority in the University. In 1976-77, $15 million were expended from general University funds for separately budgeted research and for supporting project research and a number of research centers. These include the University's Research Reactor, the largest reactor facility in the country, and the Sinclair Comparative Medicine Research Farm for Research in Aging and Chronic Diseases. Both of these facilities are administered centrally through the Vice President for Research. On each campus, specialized research facilities complement campus missions.

In addition, the University is proud of its increasing success at attracting outside funds in support of research, because this reflects faculty quality and interest in research. For example, expenditures for research from restricted funds in 1976-77 totaled approximately $40 million as compared with about $19 million in 1969.

Extension.

Since the designation of the University as a land-grant institution through the Morrill Act of 1862, the University of Missouri has carried out its mission to extend its resources of knowledge to all Missourians. In 1960, the University became one of the first in the country to combine its continuing education and cooperative extension programs so that the faculty in the various academic divisions could contribute to the educational needs of both rural and urban citizens.

Extension is a responsibility shared by the campuses and central administration. The Vice President for Extension supervises the off-campus field staff and the University's Extension Centers throughout the state; however, most extension and continuing education activities are carried out through campus organizations. Responsibility rests within the academic divisions, and coordination is provided by a campus Dean for Extension and Continuing Education.

As with the degree programs and research, the University's extension function was intensively examined during the University's institutional reappraisal process, and Part III of the Academic Plan deals with Extension. It provides an inventory of present efforts in the various disciplines and a projection to 1979-80. It is clear that the most needed emphasis is to provide for additional updating and retraining of professionals, a large number of which have acquired their initial training from the University. Over 600 faculty, full-time equivalents, conduct Extension programs. This is an important part of the University's response to the educational needs of the State of Missouri.

Extension programs from the campuses are directly based on the academic strengths of those campuses, and hence the programmatic thrust of each campus in Extension is tied very closely to its academic degree program mission. All academic responsibility for extension programs rests directly with the appropriate department or college, and the Extension Division on each campus is a coordinator and facilitator of off-campus and continuing education

instructional activities.

Resources and Support Services

Faculty and Staff.

The University's faculty and staff constitute its most important resource. With the decentralized decision-making philosophy of the Board and the President, most personnel policies and procedures have been delegated to the campuses. However, the President must act on the appointments of faculty and staff at salaries of $20,000 per year or over, and most importantly, the President has the final authority for the granting of promotions and tenure. Because tenure is the most important personnel decision made by the University, in that it affects the quality of University programs for years to come, the University monitors very closely the process by which tenure is awarded. Guidelines are established by the President and sent to campus chancellors. Following intensive screening processes used on the campuses, all recommendations approved by the individual chancellors for promotion and tenure come to the President's office for final review by the Vice President for Academic Affairs, the Vice President for Administration, and the President. This review provides a final quality-control mechanism to ensure that the University's faculty is as strong as possible.

In nonacademic staff matters, the central administration provides a monitoring and coordination function and establishes broad policies within which the campuses operate. All staff benefit programs, including retirement and insurance, are common throughout the University. Efforts have been made in recent years to continue to improve these benefits. The University has a particularly fine medical benefits insurance program, and its retirement plan, although providing fine retirement benefits, is noncontributory.

The University is committed to equal employment opportunity and to affirmative action as an important part of its personnel policies. Because most hiring and personnel practices are campus matters, the central administration has largely a monitoring-coordinating function in this area that is handled by the Vice President for Administration.

Financial Resources.

Adequate financial resources are obviously critical for the maintenance of quality programs throughout the University of Missouri. The University's total general operating budget for 1977-78 is $225,444,345. Of this amount, $141,442,464 or 62.74% is appropriated by the State of Missouri. State income and funds other than State that include student fees, Federal appropriations, recovery of indirect costs, investment and endowment incomes, sales and services of the hospital, and sales and services of educational activities, and other income provide $84,001,881 or 37.26% of the total general operating budget. The budget is developed and implemented through a complex series of steps that involve a large number of people. Each campus develops through slightly different procedures a campus budget request, which is reviewed intensively at the University-wide level by the President

and his staff in a day of in-house hearings, at which each spending unit presents its budget request to the central staff, campus administrators, and the Intercampus Faculty Council. At this session, alternatives are weighed and strategies discussed, and an attempt is made to evaluate requests in light of overall University needs, missions, and priorities. The President, with further detailed input from the Cabinet, and in the future from the Resource Council, prepares a recommended budget request to the Board of Curators, which then goes to the Governor and Legislature for action. The Coordinating Board for Higher Education independently develops a formula request for the University, which it recommends to the General Assembly and Governor simultaneously.

Following the appropriations process, the University of Missouri receives a single appropriation, with few restrictions on how it is to be spent. The University then prepares its internal operating budget, based on estimated additional sources of income, such as student fees and sales. At this point, the President and his staff play a key role in the allocation of available funds to the campuses. It has been the philosophy of the central administration in recent years to allocate at the beginning of the fiscal year as many funds for the campuses as possible, so that they have maximum flexibility to plan programs for the coming year. Only necessary central administration operating funds and a small contingency are reserved by the President. In the process of this allocation, the President consults widely with key members of his staff, the Cabinet, and the Intercampus Faculty Council. Following these discussions and deliberations, the President then recommends to the Board the internal operating budget, which includes the allocation of funds between the campuses. Allocations of funds within the campus divisions is a matter entirely for the campus chancellors and their staffs. The University's single and flexible budget enables it to adapt effectively to changing circumstances and needs.

Computer Network.

One of the major support services available to the entire University is an integrated computer network. Housed physically in Columbia, the heart of the network is an IBM 370/168 operated in tamdem with a 370/158. A large number of terminals and remote job entry points on all four campuses provide access to this powerful computing resource. The University-wide Office of Computing Activities, which administers the network and provides the basic computer service for teaching, research, and administration to the campuses and central administration, is responsible directly to the Vice President for Administrative Affairs.

Administrative Affairs.

A critical part of the central administration's support and monitoring functions is a variety of fiscal management and accountability operations, which are under the direction of the Vice President for Administrative Affairs. His office is responsible for the fiscal policies of the University, the auditing of all University operations and accounts, and the provision of accounting, budgeting, and other fiscal management services to the campuses. Fiscal reporting of grants and contracts is all handled through this office in cooperation with campus business officers and research administrators. The central administration's respon-

sibility in this area includes the University's fiscal relations with the State Auditor's office, the Governor's budget office, and legislative staff.

University Press.

The University Press is a significant University-wide resource. It provides visible evidence of the University's commitment to scholarship and to the dissemination of new knowledge. The press has won numerous awards in recent years and publishes a variety of books whose topics range from poetry to politics. Reporting to the Vice President for Administration, the Press enriches the Nation's store of knowledge while providing a publication outlet for high-quality scholarship for University of Missouri faculty members among others.

Historical Society.

The State Historical Society, including the magnificent Western Historical Manuscripts Collection, is not a part of the University per se. For State budgeting purposes, however, the appropriations to these units come through the Curators. Housed in the library on the Columbia campus, the collections provide an important support service to all four campuses and make available a rich collection of materials related specifically to Missouri and generally to the Great Plains region.

Libraries.

The University's libraries are among its most significant resources. The library directors are responsible to the chancellors on the individual campuses, but they meet on a regular basis with the Vice Presidents for Academic Affairs and Research and attempt to work together in their efforts to improve library holdings and services. In particular, the central administration has provided funds to this group in recent years to carry out some intensive studies of library operations and holdings so that efforts can be made in future years to increase support and maximize the use of additional library funds. The result of these studies, monitored by the University of Missouri Committee on Library Resources, which includes faculty as well as the directors, has been a report, "University Libraries Today", which contains recommendations for strengthening the libraries in the years ahead. This report provides the basis for a substantial request, with high priority, in the proposed 1978-79 budget for additional support for the libraries. Cooperative efforts between the four libraries provide resources to the campuses that would otherwise not be available.

Physical Plant.

The University has a physical plant, which at replacement prices is valued at $1 billion. The maintenance and improvement of this plant is largely a function of the campuses, but the Vice President for Business Management plays a key role in this area. It is his office that assists the campuses with the development of necessary repairs and renovations, and it is his office that has the major responsibility of working with the campuses to prepare

UMR OVERVIEW

Institutional Goals and Statement of Purposes

Inasmuch as the University of Missouri-Rolla is but one campus of a single university, a statement of institutional goals and purposes for the campus must begin with a statement about the University of Missouri.

The University of Missouri has the multiple responsibilities of teaching, research, extension, and public service. The University offers a wide range of baccalaureate, professional, and graduate programs; in the public sector of higher education in Missouri, it is the only institution offering doctoral programs. As a land-grant institution, the University subscribes to the philosophy of high quality education for those who have the ability and motivation to benefit, regardless of their economic status. As a university, the generation and expansion of knowledge is an incumbent responsibility. As a public and land-grant university, its mission includes extension of its resources to the people through continuing education, training, advice and counsel to business and industry, and assistance to communities to improve the quality of life for the people of Missouri. The above statements are taken from the University of Missouri Academic Plan 1975-85, Part I, Degree Programs.

With respect to the academic programs at UMR, the above document contains the following two statements:

> In the teaching sector each campus shall have a range of programs sufficient to provide quality liberal education at the undergraduate level. Each campus also shall have unique teaching responsibilities, particularly at the advanced professional and doctoral levels.
>
> The University of Missouri-Rolla (UMR) will emphasize engineering and science technology and be considered as the location for establishing selected technological programs. The arts and science program must complement engineering and provide opportunity for the baccalaureate degree in arts and sciences, as well as potential for an associate of arts degree.

The above statement of purpose for the Rolla campus is in keeping with its history and past mission. From its beginning in 1870, UMR has been the engineering campus of the University. Its programs have included not only the standard technical disciplines, such as civil, electrical, mechanical, and chemical engineering, but programs unique in the state in minerals engineering -- a fact attested to by the original name of the campus: The University of Missouri School of Mines and Metallurgy (MSM). Furthermore, UMR has a history of strength in the physical sciences, which at first were given as support for the several engineering programs. Later they attained independent, nationally recognized status but continued their support of engineering. In the more recent years, there has been an increasing emphasis upon the liberal arts, in part as a consequence of the realization of their importance to the engineering and physical sciences programs and in part as a consequence of MSM becoming

UMR and assuming the corollary responsibility to provide general education for citizens in the south central region of Missouri. It is against this background and within this framework that the institutional goals and statement of purposes of UMR are presented.

The basic academic mission of UMR may be simply stated as follows: its main thrust is in engineering and science; the campus has the University of Missouri's only programs in mines and metallurgy; the arts and sciences programs complement the engineering programs and provide opportunities for a baccalaureate degree. As part of this technological emphasis, the campus provides research, programs, and studies bearing upon pressing national needs. Currently, foremost among these needs, are the energy and materials crises and environmental and social problems. The degree programs in mines and metallurgy, for example, provide significant numbers of mineral and energy related engineers essential in meeting current long-term energy and mineral needs of the state and Nation. In keeping with these needs, UMR has always maintained as its primary objective the training of people to meet the real needs of industry, business, and government. Similarly, through its research programs, UMR has and will continue to contribute basic research necessary for the growth of knowledge and advancement of both the individual and society, intellectually, socially, and economically.

Programs in the social sciences and the humanities are not unrelated to these immediate technological concerns nor to the basic mission of UMR. Faculty in the social sciences and the humanities are exploring their traditional definitions and roles to discover special ways to contribute to this general mission. This does not mean that the traditional role of the humanities and social sciences in a university education is being slighted. Indeed, granted both the technological orientation of the students at UMR and the increasing complexity and uncertainty of the society in which they will be living and working, the traditional knowledge and values of the social sciences and the humanities are imperatives.

UMR's goals and purposes, of course, cannot be defined only in terms of academic programs in isolation from all other activities. Among these elements are supporting aspects of the graduate school, library, counseling, advising, educational media, extension, and co-op program. For example, learning resources, which include the library, audiovisual aids, FM radio, counseling testing center, and the Computer Center's Education Services Laboratory, must support fully the educational endeavors of both teachers and students. The area of learning resources provides facilities and resource personnel to aid faculty and students in the development of their educational skills and makes available alternate methods of teaching and equipment to supplement traditional modes of instruction. Audiovisual and television-viewing carrels as well as listening facilities for the FM radio's subsidiary communication authority (SCA) programming are available in the library.

In recognition of the fact that good academic advising is important for university students, the campus has strengthened and expanded its excellent program of freshman advising. This program includes the designation and in-service training of a primary freshman advisor in each academic discipline.

UMR regards the program of providing educational opportunities for the geographical area in which the campus is located as part of its basic mission. It further recognizes and has initiated a program to increase the enrollment of minority students, primarily blacks, in engineering. In the same vein, there is a definite need to increase the enrollment of women in engineering, and UMR has initiated such a program. It also subscribes to credit by examination and has active and varied programs by which students may achieve advanced standing credits.

The concept of continuing education is endorsed by UMR as a life long objective, and it has initiated a professional development degree as well as less formal postbaccalaureate experiences to satisfy that need.

UMR participates in the educational function within the State of Missouri in a host of ways that include cooperative programs with other institutions. It is ever mindful, however, of its primary responsibility for providing competitive quality educational opportunities of a somewhat traditional character for Missouri's sons and daughters. For it is thus that one continues knowledge and prepares its possessor for a full and rewarding life.

UMR also recognizes as part of its mission a greater participation in state-wide extension programs in relation to problems within the state. As a consequence, the faculty is concentrating increasing effort on applied research in order to supply the knowledge necessary for these programs.

Progress Toward and/or Achievement of Goals and Purposes

Perhaps the most difficult part of a university's appraisal of its progress toward and/or achievement of goals and purposes is to have a framework within which to perform that appraisal. The University of Missouri's Institutional reappraisal (commonly referred to as "Role and Scope") was an important step in providing a base line for continued self-appraisal and future decision-making. As noted earlier, the three-year institutional reappraisal resulted in three documents, which together composed the University of Missouri Academic Plan 1975-76. UMR thereby has a defined mission and a defined structure within the University in which to measure its progress with respect to its three basic functions: teaching, research, extension and public service. The visitation committee will undoubtedly hear much of "Role and Scope", but it should be aware that the process of self-appraisal and both internal and external evaluations that preceded the drafting, approval, and publication of the academic plan were substantive efforts to provide not only a mission for the campuses but a vehicle for the further assessment of accomplishments within that mission.

The University has, for example, established a detailed and thorough process for the initiation and approval of a new academic degree program that includes a justification within the framework of the academic plan. Each program proposal is accompanied by a series of statements, endorsed by the Chancellor, which include: a description of the program in terms of the priority and planning values as previously avowed by the campus, the proposed program's place in the Campus Academic Plan (this must be carefully stated and interpreted as

well as the program's goals of both quality and quantity), and a statement of all costs anticipated for the program in the decade following its inauguration. In addition to personnel requirements, this cost projection must include library, equipment, facilities, and expense needs.

There is also an established policy for reviewing existing degree programs. Within this policy, each degree program in the University is accorded a review and a commitment for the level of its continuance at intervals of approximately five years. Each degree program review requires a self-study prepared by the department or discipline under review. The self-study speaks to but is not limited to its mission, its strong and weak points, the number, source, and quality of students, faculty productivity, student-faculty ratios, SCH cost by level, employment opportunities, national awards and grants, number of degrees granted, and interrelation with other programs, including those of other campuses. Although it is understood that the entire discipline is examined during the course of this review, special attention is given to the graduate programs at Rolla. After the appropriate campus review, the self-study is forwarded to the office of the Vice President for Academic Affairs of the University where further reviews may take place. Any judgments are made available to the discipline and implemented through normal channels.

The University has also established a Doctoral Faculty, which includes members of the faculty on each campus qualified to guide doctoral students and facilitates commitments for doctoral programs throughout the University. In addition to enhancing collaboration among the campuses in disciplines or sectors, the University Doctoral Faculty is expected to assure or improve quality among existing and new programs and provide greater opportunity for faculty and easier accessibility for students while lessening the need for stand alone programs.

Inasmuch as UMR has always maintained as its prime objective the education of students to meet the needs of industry, business, and government, one measure of achievement is the receptivity of UMR graduates by the various branches of society. In this light, UMR has been and is extremely successful in accomplishing its purposes and goals and can measure its achievements by the fact that many graduates receive multiple offers of employment* each year. Furthermore, salaries paid to engineering graduates of this campus are among the highest in the country. The success of achievement of UMR and its programs is further testified to by the many students who come to UMR from other states and foreign nations as a result of its excellent and long-standing reputation. In addition, the military in recent years has sent many of its engineers to the Rolla campus for postgraduate training. As a result of the broad engineering program at UMR, the State of Missouri has come to be known as a principal supplier of engineers whose competence is of the highest order of excellence.

Another somewhat indirect measure of achievement is the fact that UMR's School of Mines and Metallurgy was recently ranked nationally as one of the top five in quality by the Department of Interior which also included the School among the Category I institutions in its report to the Congressional Mines and Mining subcommittees of Interior and Insular Affairs.

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*Appendix

The accreditation of departments by various discipline oriented accrediting agencies is still another measure of achievement. Each of the disciplines in engineering and mines and metallurgy is reviewed for accreditation by the Engineers Council for Professional Development.* Nuclear Engineering, for example, was first accredited in 1960 and was the first such program to be accredited in the country.

Apart from the procedures and methods described above for monitoring the achievement of goals and purposes, UMR has worked to establish an ongoing academic and administrative structure to provide the mechanism for reordering goals and objectives on a continuing basis and for monitoring their accomplishments. The following self-studies by the various academic units on campus discuss in detail internal governance, faculty committees, student input, fiscal and personnel management, faculty research activities, faculty extension activities, and the strength and weaknesses of total programs. These unit efforts are brought into campus-wide focus by several different means. First, the Academic Council is charged as the legislative and policy-making body of the general faculty. As such, it assists in the implementation of policies concerning the educational and research operations of the campus and other matters affecting the welfare of the campus, the faculty, and the students. It deals with academic standards, courses of instruction, and the general standards to be met by educational, research, and service programs. It makes recommendations to the Chancellor on institutional facilities, personnel, and resources. It concerns itself with professional standards, employment qualifications, tenure, promotion, salary, retirement, and other factors affecting faculty morale and welfare as well as student affairs including the health, welfare, conduct, and morale of the students. Second, there is a Graduate Faculty, which is responsible for the establishment of the policies, rules, and regulations governing all graduate studies on the campus. Specific functions of the Graduate Faculty include the responsibility for research and for creative or scholarly work on the graduate level, a special regard for campus problems involving graduate students, the determination of regulations concerning eligibility and requirements for graduate degrees, and curricula and course offerings. The Graduate Faculty also administers graduate fellowships, scholarships, and similar awards.

The efforts of the academic units also gain campus-wide focus in the regular meeting of two separate committees: The Committee of Deans, which discusses and makes recommendations concerning any aspect of the academic program, and the Chancellor's Council, whose efforts are far-ranging and encompass the total activities of the campus. It is in the Chancellor's Council especially that all matters pertaining to the goals and mission of the campus are reviewed and the necessary determinations made to ensure their achievement.

Instructional Programs

The degree programs offered at UMR were reviewed in detail in conjunction with the Academic Plan 1975-1985, Part I, Degree Programs, adopted for the University of Missouri in 1974. Programs are identified that are to be continued, dropped, or initiated within the next decade. The campus has moved toward having the following new degree programs approved:

*Appendix

the Ph.D. in Computer Science, Ph.D. in Engineering Mechanics, B.S. in Life Sciences, and BA/BS in Sociology. Of these, the Ph.D. in Computer Science has been initiated. The B.S. in Life Sciences has been approved for initiation in September 1978. The other two are being held on campus for a variety of reasons not least of which is lack of a source of funding. This is and has been a UMR decision.

The engineering curricula are reviewed on a reoccurring basis by the Engineers' Council for Professional Development in cooperation with the corresponding professional societies. All programs on campus also undergo an internal review periodically as detailed in the previous section.

The programs are coordinated rather closely, primarily because there are a large number of out-of-department courses utilized in each curriculum. The first level of coordination is accomplished at the school or college level, where each, i.e., Arts and Sciences, Engineering, Mines and Metallurgy, and Graduate, has committees that consider program-related matters. Each department within a school or college is normally represented on the committee. Matters that must be coordinated between schools and/or college are handled by the UMR Curricula Committee. Here, each school or college is represented on the Committee.

The following summarizes the procedures and programs introduced in this section:

1. Procedures for Approval of Course Changes

   Requests for additions, deletions, or changes in courses are initiated in the departments and submitted to the school and/or college dean. Each school/college has its own procedural guidelines for considering the requests, which generally include consideration by a school/college curricula committee, and circulation of the requests to the departments within the school/college. Requests approved by the dean are forwarded to the UMR Curricula Committee. A copy of the guidelines for action by the Curricula Committee is appended.* These also include procedures for resolving conflicts between departments regarding requests and for cross-listing courses if this is desired. Final action on requests is made by the Academic Council; the requests are brought before the Council by the UMR Curricula Committee.

2. Procedures for Approval of Degree Changes

   Requests for changes in degree requirements are considered in the same manner as course additions, etc., as described above.

*Appendix

3. Inventory of Degrees/Majors at UMR 1976-77 (by year initiated)

Discipline	B.A.	B.S.	P.D.D.*	M.S.T.*	M.S.	Ph.D.	D.E.
Aerospace Engineering		1967	1974		1967		
Ceramic Engineering		ca. 1937	1974		1925	1925	1971
Chemical Engineering		ca. 1891	1974		1920	1957	1971
Chemistry				1960	1931	1964	
Civil Engineering		ca. 1877	1974		1923	1964	1971
Computer Science		1966			1964	1976	
Earth Sciences				1960			
Economics		1971					
Electrical Engineering		ca. 1891	1974		1947	1963	1971
Engineering Management		1967	1974		1970		
Engineering Mechanics		1966	1974		1964		
English	1968						
Geological Engineering					1959	1965	1971
Geology and Geophysics					1931(Geol.)	1975**	
					1964(Geophys.)		
History	1968						
Humanities	1967						
Mathematics		ca. 1920		1960	1961	1967	
Mechanical Engineering		ca. 1913	1974		1948	1965	1971
Metallurgical Engineering		ca. 1877	1974		1893	1933	
Mining Engineering			1974		1873	1951	1971
Petroleum Engineering			1974		1966	1966	1971
Philosophy	1968						
Physics				1960	1931	1965	
Psychology		1971					
Nuclear Engineering			1974		1958	1965	1971

*The Professional Development Degree is an innovative degree for providing further education for professionals (primarily engineering). It is administered in the departments but is sufficiently important in the mission of UMR that a description of it is provided. The M.S.T. is a Master of Science for Teachers continuing education degree of similar purpose.
**The Academic Plan integrated the Ph.D.'s in Geology (1931) and Geophysics (1964) into a Ph.D. in Geology and Geophysics (1975).

UMR Administration

Chancellor

The Chancellor is the chief administrative and academic head of the campus and is accountable for all campus operations and programs. He serves as the institutional link between the campus and the central administration's organization in Columbia and chairs the campus Administrative Council and Chancellor's Council. He presides at all campus faculty meetings and all meetings of societies, conferences, and official events, unless these responsibilities are specifically delegated to other staff members. He also serves in a staff capacity as an advisor to the President.

Provost/Dean of Faculties

The Provost/Dean of Faculties is responsible to the Chancellor for the following operations: Admissions and Registrar, Center for International Programs and Studies, Library, Nuclear Reactor, Computer Center, Learning Resources, Institutional Studies, and the Academic Council.

Deans of Schools and College

The deans of the schools and college are accountable to the Chancellor for the operations of their total programs. They channel matters relating to academic programs, academic appointments, academic evaluations, promotions, and tenure through the Office of the Provost/Dean of Faculties and direct matters related to fiscal affairs, business space allocation and resource management through the Office of the Business Officer. Graduate School matters including admissions, appointments of graduate students and research administration are channelled through the Graduate Dean. Specifically the deans are responsible for all divisional teaching, research, and extension activities.

Dean Student Affairs

The Dean of Student Affairs is responsible to the Chancellor for the administration of the student affair programs on campus. The various offices under his direction are: Co-op Education, Athletics, Placement, Financial Aid, Student Health, Student Personnel, and Student Budgets.

Dean of Extension and Continuing Education

The Dean of Extension and Continuing Education and his staff are generally responsible for the implementation of all academic and service programs that are provided off campus.

Business Officer

Under the direction of the Chancellor, the Business Officer is responsible for the fiscal,

business, and related administrative operations of the campus. The function in support of business and physical operations are Budget and Records, Finance, Personnel, Physical Plant, Purchasing, University Policy, and Auxiliary Enterprises.

Chancellor's Council

The Chancellor's Council is a decision-making body consisting of the Chancellor, Provost/Dean of Faculties, Executive Secretary, Dean of Mines and Metallurgy, Dean of Engineering, Dean of Arts and Sciences, Dean of Graduate School, Dean of Extension and Continuing Education, Dean of Student Affairs, Business Officer, Chairman of the Academic Council, Director of External Affairs, and Director of Institutional Studies.

Administrative Council

The Administrative Council is an information-exchange body consisting of the above named members of the Chancellor's Council, the Department Chairmen, Director of Admissions and Registrar, Director of the Graduate Center for Materials Research, Director of the Graduate Center for Cloud Physics, Director of the Rock Mechanics and Explosives Research Center, Director of the Environmental Research Center, Director of the Center for International Programs and Studies, President of the Student Council, and President of the Graduate Students' Association.

Committee of Deans

The Committee of Deans, which meets under the chairmanship of the Provost/Dean of Faculties, makes recommendations to the Chancellor relative to matters that are of mutual interest to the schools and college.

Director of External Affairs

In November of 1975, an Office of External Affairs was established. This combined the offices of Alumni, Development, and Public Information. It is headed by an executive director who reports directly to the Chancellor. This director is responsible for the direction of these three offices as well as planning and implementing an expanding development effort.

Resources Management and Planning Council

Although the campus has had previous budget committees, the Resources Management and Planning Council was formed to provide a broader base for budgeting and planning. It is headed by the Chancellor and includes the Provost/Dean of Faculties, all the UMR deans, the Business Officer, the Chairman and Chairman-Elect of the Academic Council, the Director of External Affairs, the Chairman of the Academic Council Budgetary Affairs Committee, the Administrative Associate of the Provost's Office (non-voting), and the Director of Institutional Studies (non-voting).

ACADEMIC DIVISIONS

GRADUATE SCHOOL

The members of the Graduate Faculty accept research and teaching as primary responsibilities. Most of these activities, which are fundamental to the education of the students and further development of the faculty, are performed in traditional disciplines. Other interdisciplinary objectives are capable of being met through rather well developed research centers and less formal institutes.

Organization of the Graduate Office

The principal responsibility of the Graduate Dean is the overview of all activities related to graduate students and to faculty serving those students. Additionally, he is responsible for research administration and for those funds that are centrally administered and impinge on research and graduate education. He chairs the campus committees on honorary degrees, program reviews, capital improvements, and energy utilization. He also chairs a statewide committee of Graduate Deans and serves on the campus committee for Promotion and Tenure, Committee of Deans, Chancellor's Council, and the Chancellor's Administrative Council. At the central administrative level, he serves as chairman of the Graduate Deans Group, as a member of the Doctoral Council, and on an ad hoc Budgetary Task Force Committee. This latter responsibility extends to a state-wide formula budgeting effort of the Coordinating Board for Higher Education.

The Associate Graduate Dean assists in these functions and assumes their responsibility in the absence of the Dean. His principal function is, however, directed toward the coordination and administration of Research Grants and Contracts. In this role, he administers proposal editing and preparation service, proposal review and campus signoff, and fiscal accountability.

The organizational structure and functions are to be found in the file materials* provided for the North Central Accreditation Task Force.

Graduate and Doctoral Faculties

The Graduate Faculty consisting of about 250 members is the campus group responsible for those factors of graduate program quality that are conventionally delegated to faculty. Duties and purposes are described under Rules and Regulations, May 1971, and these rules and membership qualifications are also on file*.

Because it is difficult to assemble all of the Graduate Faculty on a regular basis--a Graduate Faculty meeting is called once per semester--a Graduate Council meets monthly to prepare needed changes in rules and discussions to be brought before the Graduate Faculty. The purpose of the Graduate Council is: 1) to provide a minimum

*Appendix

number of representatives who can represent the opinion and philosophy of the Graduate Faculty membership, 2) to provide the Graduate Dean with a means of continuously sampling between the semester sessions of the Graduate Faculty the attitude of the members with regard to policy and procedures, and 3) to provide a broader forum for the development of changes in Graduate School procedures, policies, and programs. The Council is staffed through working committees, which function in the areas of Advice, Membership, Curricula, Research, and Scholarship. The Advisory Committee initiates most graduate rules.

Early in the academic degree planning program for the University System, it was recognized that the graduate program expansion of the 60's needed guidance and some constraint. As a result, programs were assigned to the campuses in relation to the mission of each campus. Faculty participation in the doctoral programs, where qualified, was defined by a shared doctoral program concept, and a Doctoral Faculty was selected under specified criteria during the 1973-74 academic year. The initial selection procedures involved sets of campus and intercampus review committees. These committees screened the applications submitted by the department. The process was coordinated by an ad hoc Doctoral Council composed of a Graduate Dean from each campus and two presidentially appointed faculty members from each campus. This ad hoc Council has since been replaced by a University Doctoral Council, which, again, includes four Deans but now includes two faculty members from each campus who are elected by the Doctoral Faculty of that campus. The Council is currently improving and developing procedures for the continuing election of new members and the reappointment of original members as their appointments expire. All appointments are for five years.

The purpose for naming a Doctoral Faculty was to identify those persons who are best qualified to direct dissertations and to expand participation of faculty and students, irrespective of their campus location, in existing doctoral programs.

The membership of the UM Doctoral Faculty is 1036 of which 137 are UMR members. Thus, about 40% of the UMR faculty and 56% of the UMR graduate faculty are doctoral faculty members.

Graduate Student Association

(Prepared by Frederick Rambow, former President)

The primary purpose of the Graduate Student Association (GSA) is to promote the general welfare of the graduate students. GSA provides graduate students access to administrative channels and ensures the representation of graduate needs in the political arena. Such accessibility cannot be obtained through the student council.

Believing it to be in the best interest of the graduate student, the GSA contines to support high standards of graduate education. A high quality degree better prepares

a student for competition in the job market and for the job. It also assures the employer of getting his money's worth and strengthens the intellectual base of the Nation.

Although the GSA is aware of the formerly large number of foreign graduate students and the purported problems they created, it does not favor a quota system. Rather, it favors improved screening of entrants especially in language arts with the responsibility for the entire costs of the student's education being borne by the student and his government. A quota system without intense screening would only water down the problems and in the long run short-change the student and his country.

The need for independent financing of the GSA is indicated. There are pronounced differences between the graduate and undergraduate students in terms of age, scholastic requirements, and affiliation with the University to name a few. These differences provide a chronic potential for conflict between graduate and undergraduate interests and needs. Thus, it is desirable for the political body representing graduate students to be independent of the undergraduate political body financially as well as organizationally.

In looking to the future,the GSA can make no long-term predictions for graduate education on the UMR campus. There are too many variables. Given an outstanding research faculty with adequate equipment and support staff, competitive graduate stipends, access to resource material, and reasonable rules together with decent housing, UMR can look forward to attracting the best graduate students. The GSA will do all it can to bring this about. However, only if UMR can continue to attract outstanding faculty members who are research oriented, can we expect to have a strong graduate program.

Graduate Student Body

For the fall semester of 1977, there were 132 doctoral and 358 masters candidates registered on the Rolla campus. In addition, two groups of students were registered and administered through the Extension Division. At the UMR Graduate Engineering Center (GEC) on the campus of the University of Missouri-St. Louis (UMSL), 338 part-time students are working toward M.S. degrees in several major areas (Table 1).

Table 1

Degree Areas and Enrollment at UMR Graduate Engineering Center

Degrees	Enrollment
Aerospace Engineering	7
Chemical Engineering	4
Civil Engineering	54

Degrees	Enrollment
Computer Science	45
Electrical Engineering	32
Engineering Management	74
Engineering Mechanics	17
Environmental Engineering	1
Mechanical Engineering	20
Metallurgical Engineering	2
Nuclear Engineering	3
Special (non-degree)	79

At the St. Louis location, UMR has seven resident faculty, uses UMR resident faculty, and employs additional industrial adjunct faculty.

On a less well defined basis, limited masters programs have been or are being offered at Fort Leonard Wood, Joplin, Springfield, Viburnum, and Jefferson City.

Graduate enrollments and degrees granted during the past several years are given in Table 2.

Table 2

UMR Graduate Enrollments and Degrees

Enrollment (end 4th week)	Fall 1971	Fall 1972	Fall 1973	Fall 1974	Fall 1975	Fall 1976	Fall 1977
Masters (Rolla)	471	380	400	376	386	364	358
Masters (St. Louis)	662	552	459	364	383	333	330
Masters (Other Ext.)	79	123	115	83	115	51	35
Doctors (Rolla)	185	170	166	151	156	155	132

Degrees Granted (Fiscal Year)	70-71	71-72	72-73	73-74	74-75	75-76	76-77
Masters (Rolla)	354	279	212	214	186	175	175
Masters (St. Louis)	112	137	122	113	73	73	52
Masters (Other Ext.)	0	9	1	9	15	17	11
Doctors (Rolla)	43	58	55	39	42	27	46

A specific item, which troubled UMR and the visiting committee in 1972, was the quality of the then current graduate students. The visiting committee, concerned over the quality of courses in which an appreciable number of special students were enrolled, suggested as a guideline that at least 75% of the students in the graduate classes should be regularly admitted graduate students.

Admission to the Graduate School at UMR requires that the regular admissions be among the upper scholastic third of those who hold BS degrees. Special admissions, many of which are on a continuing non-degree basis, require the consent of the Graduate Dean. After 12 hours of graduate work of B or above, special students may apply for reconsideration and regular admission. Most masters degree candidates succeed in their degree goals.

The following actions have been taken to improve the scholarly profile of UMR students and to increase the ratio of students with the grade of B or above.

1. The graduate assistant stipend has been gradually increased to $9,000/9 months per full-time assistant. Half-time assistants receive $4,500 (1978-79) and are employable for three months during the summer for up to three-quarters time. One-quarter, one-half, and three-quarters stipends are the normal levels of compensation. This has improved recruitment.

2. Chancellor's Fellowships for $1,000 are payable at the rate of $250 per semester. They have been made available to superior students as a supplement to their other forms of compensation. This is comparable to the partial fee waiver of other institutions.

3. Continuing education needs for engineering students are now served by the initiation in 1973 of a postbaccalaureate Professional Development Degree, which is administered by the participating academic departments. It serves capable students as well as those who are not normally admissible to traditional graduate degree programs. At the same time, it provides a mechanism for limiting enrollment in graduate courses to qualified graduate students. The 400-level courses cannot be taken by postbaccalaureate students.

More use is being made of GRE scores to identify students whose academic abilities are not reflected by the UGPA. In fact, many undergraduate engineering students with average and low grades possess V + Q scores in excess of 1200. The comparison shown in Table 3 of the percentage of students in residence at UMR as regulars* since 1972 shows constant student improvement.**

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*Regular student status is retained for students in the upper third of their baccalaureate class. UMR arbitrarily defines this as a GPA of 2.75 or above.

**Grading patterns at UMR have remained relatively constant during the period of improvement, thus grade inflation is not an appreciable factor.

Table 3

Number of Regular Graduate Students in Residence at UMR

Year	Spring		Fall	
	Percent	No.	Percent	No.
1972	48	290	-	-
1973	59	316	63	357
1974	65	345	70	369
1975	69	326	70	379
1976	72	368	77	399
1977	78	365	80	392

According to the latest data, only 11% of the graduate students remain below a 2.5 GPA capability, whereas in 1972 the percentage was 39%. These students are now being phased out. (See the discussion "Further Education for Professionals".)

Of all entering students, the average UGPA is now 3.2. This is consistent with the national standards of doctoral producing institutions.

Research and Research Administration

The Graduate School has the function of promoting research and its developmental relationships for both graduate students and faculty. It also has shared responsibility in the administration of research related to grants and contracts.

The figures in Table 4 show separately budgeted campus expenditures for research during 1976-77. The separately budgeted research category includes the research expenditures of UMR's three schools and college.

Table 4

UMR Research Expenditures 1976-77

Research Support	Expenditures
Restricted Expenditures	$2,339,652
General Operating	1,345,377
Estimated G.O. Departmental (I&DR)	544,197

As may be observed, most of these funds have been granted as a result of the efforts of research oriented faculty who write proposals. The success ratio of 49% of the proposals written* (essentially all non-solicited) is complimentary of the graduate students and faculty involved. UMR contract dollar values, whether based on FTE research faculty, total faculty, or graduate students, are among the highest in the system.

*Appendix

The Graduate School does not directly administer any separately budgeted research unit nor does it support functions for research. It does, however, have limited funds for the support of faculty and graduate student research. During 1976-77, it coordinated the awarding of the following funds (Table 5):

Table 5

Graduate School Research Support

Chancellor's Fellowships	$ 9,500
Graduate Assistantships	757,600
Special Equipment	322,641
Faculty Research	52,681
Summer Appointments	45,000

Although the annual fiscal expenditure of grants and contracts for research does not show the recovery of indirect costs, it is probably the best measure of support a university can generate. Another measure which is often presented, shows either the face value of all existing contracts for a given year or, more modestly, the face value of all contracts approved during a given fiscal year. The latter measure is used in Table 6 to exhibit changes during the past few years. The change in the Federal fiscal year and the loss to the campus of two faculty members who had histories of major contract achievements has perturbed the apparent successes for 1976-77. New contracts received in the current year are running ahead of those that led to UMR's best year in 1975-76.

Table 6

Contracts Approved During the Fiscal Years of 1970-1977

	1970-71	1971-72	1972-73	1973-74
Directs	$2,585,725	$2,456,929	$2,987,540	$2,320,761
Indirects	507,995	426,482	611,484	475,590
Total	3,093,720	2,883,411	3,599,024	2,796,351

	1974-75	1975-76	1976-77
Directs	$3,579,727	$3,614,019	$2,700,910
Indirects	664,729	736,669	458,423
Total	4,244,456	4,350,689	3,159,333

COLLEGE OF ARTS AND SCIENCES

Statement of Purpose

The primary purpose of the College of Arts and Sciences of the University of Missouri-Rolla is similar to that of any college in a modern university: to provide instruction in those disciplines that constitute the foundation of a higher education. These include the physical sciences, English, mathematics, humanities, and social sciences. However, because UMR's enrollment has for many years been primarily in engineering curricula (75 to 80%), much of the departmental teaching in the College services the engineering programs. Over 90% of the freshman year and over 75% of the sophomore year of all engineering curricula are taught in the College of Arts and Science. The second purpose of the College is to maintain strong degree programs in the arts and sciences disciplines at both the undergraduate and graduate levels. A third purpose can be ascribed to the geography and demography of the Rolla area. There are no two-year or four-year colleges within 60 miles of UMR; therefore, students who want to "try college" while living at home come to this campus. Some find that the degree programs here suit them, and they stay to complete their work for a baccalaureate degree, some transfer to other institutions after a year or two to pursue such subjects as elementary education, agriculture, and nursing, and a significant number find that higher education is not for them, and they drop out after a semester or two.

History

The traditional arts and sciences disciplines have been a vital part of UMR's program since the institution was founded in 1871. The first director was a chemist, and other leaders have come from the arts and sciences disciplines of mathematics, geology, physics, and English. The College as it is now constituted was organized as a separate administrative entity in 1970. It offers degree programs in undergraduate (U) and graduate (G) chemistry, computer sciences (U&G), geology and geophysics (U&G), humanities (U), mathematics (U&G), life sciences (U, beginning in the fall of 1978), physics (U&G) and social sciences (U). In addition, courses in music, art, physical education, and military sciences are included in its offerings. An interdisciplinary research effort, the Graduate Center for Cloud Physics Research, is included in the College of Arts and Sciences.

Function and Organization

The College of Arts and Sciences is administered by a Dean who holds a departmental appointment and teaches in the Department of Chemistry. A position for a half-time Assistant Dean will be filled in the fall of 1978.

Each of the departments of Chemistry, Computer Sciences, Geology and Geophysics, Humanities, Mathematics, Physics, Physical Education, and Social Sciences

has a chairman who is appointed annually by the Chancellor on the recommendation of the Dean. The service of each chairman is evaluated annually. The evaluation includes a response from the faculty to the Dean, and quadrennially the department is reviewed in detail by the Dean. This review allows him to make an in-depth assessment of the chairman's service, with the understanding that a change in the chairmanship can be made at the time if it is considered desirable. In the last six years, there have been six new chairmen appointed to serve in the College's seven degree-granting departments.

The procedure for selecting a new department chairman is as follows: The department elects a search committee, which solicits applications from within or outside of the department. Following a screening and interviewing process, the names of at least three satisfactory candidates are presented to the Dean who makes the nomination from among those presented. The Chancellor makes the appointment.

The chairmen are expected to provide the dean with recommendations for the promotion and tenure of faculty. They are assisted and advised in this by the faculty members of their departments through procedures generally specified by campus guidelines. Each department has some autonomy in implementing the campus guidelines. In addition the chairmen recommend the salaries for the members of their departments, again with the advice of the faculty as specified by each department's wishes.

The College of Arts and Sciences Personnel Committee, which is composed of an elected member from each department, reviews promotion and tenure recommendations from the departments and provides the Dean with a summary of its position on each proposed action.

The department chairmen together with the Chairman of the Military Science Department, the professor-in-charge of the Life Sciences program, and the Director of the Graduate Center for Cloud Physics Research meet monthly with the Dean to coordinate academic programs, fiscal expenditures, and other activities. The department chairmen have essentially complete freedom in planning the use of the departments' operating funds within the University's fiscal guidelines; consequently, the amount of support expended for travel, seminar speakers, and other discretionary items varies with each department.

The College of Arts and Sciences regularly receives a significant share of the University's "Special Equipment" funds, and each department has an opportunity to acquire some needed large item of equipment through this program. The Dean's Fiscal Advisory Committee assists in the distribution of these funds by reviewing each department's list of priority requests. It has also been the practice of the University to support requests for funds to match Federal funding programs for the acquisition of large items of equipment for undergraduate instruction or research. This program provides a means for the departments to keep their equipment up to date.

Instructional Programs

The Bachelor of Arts degree is offered at UMR to students who elect studies within the disciplines of Humanities and Social Sciences. The Bachelor of Science degree can be obtained in the disciplines of Chemistry, Geology and Geophysics, Computer Science, Mathematics, Physics, Economics, Psychology, and Life Sciences. The Master of Science and Doctor of Philosophy degrees are offered in Chemistry, Computer Science, Geology and Geophysics, Mathematics, and Physics (Table 7). Enrollments in these degree programs for the past five years are shown in Table 8.

Faculty Research Activities

Faculty research is a prime activity in all departments except military science in the College of Arts and Sciences. In those departments that have graduate programs, this research is of thesis and dissertation quality, and essentially all of it is published in refereed journals in the respective fields. Within recent years, these departments have been very successful in competing for faculty development fellowships and research. The amounts of the awards for 1976-77 are given in Table 9.

Faculty Extension Activities

The departments in the College have offered a limited number of courses for college credit outside of the regular daytime campus offerings. These include courses that have been taught at nearby Fort Leonard Wood, at the Missouri State Correctional facilities in Jefferson City and Moberly, and in the nearby towns of Waynesville, Lebanon, and Houston.

The College's extension activity has been of the non-credit variety and has included a series of short courses on paint and coating that have been offered through the Department of Chemistry for over 15 years, an ore microscopy course sponsored by the Department of Geology and Geophysics, a number of activities offered through the departments of Humanities and Social Sciences and funded by the National Endowment for Humanities, and some enology studies have been conducted by the Department of Chemistry to assist the local wine industry. The Department of Humanities is conducting an active program in service to the aging in the Rolla area that is meeting with strong interest and success.

Other Faculty Activities

The departments have been active in promoting the faculty's professional growth and renewal. Five percent of the faculty members either have taken advantage of the University's sabbatical leave policy each year or have obtained externally funded fellow-

Table 7
Degrees Awarded by the College of Arts and Sciences

	B.A. & B.S.					M.S.					Ph.D.					M.S.T.*				
Disciplines	72-73	73-74	74-75	75-76	76-77	72-73	73-74	74-75	75-76	76-77	72-73	73-74	74-75	75-76	76-77	72-73	73-74	74-75	75-76	76-77
Chemistry	13	22	26	24	11	2	7	2	3	5	4	3	4	2	1	11	3	-	-	-
Comp. Sci.	67	73	63	59	56	25	39	18	22	32	-	-	-	-	-	-	-	-	-	-
Economics	7	8	12	13	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
English	12	15	11	3	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Geol. & Geophys.	15	25	14	16	13	4	10	9	9	3	3	2	1	1	5	-	-	-	-	-
History	21	12	8	6	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mathematics	25	26	18	14	10	9	10	4	3	3	4	3	6	4	6	6	8	4	2	-
Philosophy	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physics	14	22	14	18	10	13	6	5	6	7	6	3	1	9	4	4	2	-	-	-
Psychology	21	32	20	26	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phys. Science	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

*Master's Degree program for high school teachers through an NSF grant.

Table 8
Fall Enrollment Figures

Year	Bachelors	Masters	PhD	PB/PDD	Total	Total GEC St. Louis
1973	1056	110	76	-	1242	41
1974	975	94	70	-	1139	44
1975	994	101	73	-	1168	42
1976	915	114	76	-	1105	47
1977	859	107	65	2	1033	44

Table 9
1976/1977 Expenditure Data

College of Arts and Sciences	Sponsored Research*	Other Sponsored Programs**
Dean's Office	-	$ 300
Chemistry	$123,135	107,337
Computer Science	39,001	143,146
Humanities	-	9,153
Mathematics	25,848	351
Physics	295,865	1,516
Geology and Geophysics	84,498	55,705
Social Sciences	31,166	74
TOTAL	$604,513	$317,582

*Direct costs only but includes the proration of research conducted in separately budgeted research centers. Indirect costs, although not included in these data, were recovered at a rate of 32% of direct costs.

**Includes sponsored instructional and departmental research, sponsored extension, and other sponsored programs.

ships to spend a year away from their regular campus assignments.

Faculty participation in professional organizations is strongly encouraged, and a respectable number of faculty are involved beyond their regular membership obligations. Within the last two years, the following professional groups have held their meetings on the Rolla campus: National Meeting of the American Association of Physics Teachers, Midwest Regional Meetings of the American Chemical Society, Missouri Philological Association, Midwestern Regional Computer Programming Competition for the Association for Computer Machinery, and Missouri Geological Association.

Each department has an active student organization within its discipline, such as an honorary fraternity or a student chapter of a professional organization.

A faculty member in the Department of Computer Science spent a year's leave of absence assisting one of the State's agencies at the capital in organizing a computer operation. A program has evolved from this assocation that provides external annual employment for more than ten computer science students during their junior year.

Strengths of Programs: Needs for the Future

The long history of this institution's strength in science and engineering annually attracts a freshman class that is distinctly above the average in mathematical ability for entering students in higher education, and these same students have a correspondingly high aptitude. The scores provide evidence that the average UMR student is in the 80 to 85 percentile in terms of aptitude. There is a long tradition of high expectations by the faculty of the students' abilities in mathematics and sciences, and this has contributed to a high self-image on the part of the faculty. In the last 20 years, a significant enhancement of the quality of the faculty in the humanities and social sciences has occurred as a result of a concerted effort to raise their level and to make improvements. One of the specific moves made to accomplish this was to provide comparable salaries in all disciplines across the campus. This has attracted a high caliber of faculty to the campus in the nonscience areas.

The need for strong leadership in the chairmanships of the departments has been seen by the faculty and the administration and has resulted in the appointment of chairmen with fresh, vigorous, and enthusiastic attitudes that are apparent in the departmental activities.

Perhaps one of the strongest assets of the College of Arts and Sciences is its adjustment to the modern condition of higher education. When the enrollment at this institution turned downward in the late sixties and early seventies, necessary faculty reductions and a tightening of the operating budget resulted in a dour outlook on the part of the members of the faculty toward their future and that of the institution. However, the faculty reductions that were effected and the trimming of expenses slimmed the campus to a trim fighting weight so that it could expeditiously proceed with the task at

hand. The decided recovery in enrollment that has taken place over the past three years and the projections that indicate a steady course ahead, along with the strong feeling that the kind of education that is offered to the kind of student who graduates from this institution, are the most direct attacks that can be made to solve some of this Nation's and the world's problems--these have contributed to a pronounced recovery of a sense of mission. There has been a need to make some faculty additions in some areas, and with a strong buyer's market it has been possible to make excellent appointments at an adequate but conservative rate. The members of the faculty have been successful in obtaining outside funds to support their research and other professional activities with significant amounts in areas that have not been funded on this campus in the past. Faculty development via sabbatical leaves and interdisciplinary ventures is at a recent high.

Concerns that need attention in the College of Arts and Sciences are common with concerns of higher education generally. Faculty salaries do not compare well with national norms and the rate of inflation, but the State of Missouri is making moves to improve this condition. Operating funds, which have been held at low levels to provide funds for some faculty salary increases in recent years, have appeared to show some upward movement in the 1978-79 budget. However, the lean and hungry faculty members have shown resourcefulness in keeping quality education as their first concern, and a positive slope is evident on most plots of quality indicators.

SCHOOL OF ENGINEERING

Statement of Purpose

The primary purpose of the faculty in the School of Engineering is to establish an atmosphere in which excellence of achievement relative to academic missions is sought, recognized, and rewarded. In order to attain this, the Dean, in concert with his faculty, must formulate clear statements of long-term objectives. These can then be used to allocate resources and to measure success of achievement.

Because success is the result of the actions of people, faculty members with imagination, drive, and enthusiasm must be recruited and retained. Creative and dedicated people are the most precious asset of the School of Engineering, because they can attract the resources, both human and financial, that the institution needs to achieve its long-term goals.

An active and involved faculty will develop all avenues of education available to the institution. Undergraduate and graduate instruction, research, extension, and public service are all educational activities, which may be directed towards different audiences. For a school of engineering to be successful, it must have active, developing programs in all of these areas.

History

Engineering education on what is now the UMR campus began in 1870. From its earliest days, the University of Missouri School of Mines and Metallurgy included curricula in all engineering disciplines appropriate to the time. As the state-of-the-art improved, the program was expanded to meet the need for additional professional specialization. In 1964, the campus was named the University of Missouri-Rolla, the School of Engineering was established, and the School of Mines and Metallurgy was retained.

Since World War II, a consistent effort has been exerted to enlarge and strengthen the graduate programs in engineering at a pace that would assure strength and quality. At the same time, every precaution has been taken to ensure that the nationally acclaimed undergraduate program was preserved and maintained at the highest levels of academic excellence. During the decade of the sixties, the thrust of this effort to expand the graduate program was increased and that emphasis has continued into the seventies.

Function and Organization

The School of Engineering is composed of six departments: Chemical Engineering, Civil Engineering, Electrical Engineering, Engineering Management, Engineering Mechanics, and Mechanical and Aerospace Engineering. The department chairman for each is appointed by the Chancellor on recommendation of the Dean. While these appointements are made annually, it is assumed that the chairmen will serve a number of consecutive terms. The chairman is the administrator of his department and not merely one who "chairs" departmental

meetings and passes on vote results to the Dean. Each chairman is the originator of all recommendations regarding salaries, promotion, and tenure for departmental faculty. Each utilizes a peer group for advice on these matters.

All of the chairmen, together with the Dean and Assistant Dean, constitute the School of Engineering Executive Committee.

The School has the following faculty committees: Planning and Advisory, Curricula, Admissions and Standards, Core Curriculum, Student Academic Affairs, Agenda and Nominating, and Graduate Advisory. Members of these committees are selected by the departmental faculty and contain some student members.

A rather informal and friendly relationship exists between students and faculty. The student chapters of numerous engineering societies as well as Department and School honor societies develop student leaders who keep the faculty, chairmen, and Dean aware of student ideas.

Instructional Programs

Degree offerings follow the departmental organizations and include Bachelor of Science, Master of Science, Doctor of Philosophy, and Doctor of Engineering. Not all curricula have approval to offer all degrees. This may be summarized as follows: B.S., M.S., Ph.D., D.E.: Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering; B.S., M.S.: Aerospace Engineering, Engineering Management, Engineering Mechanics; M.S.: Environmental and Planning Engineering (Civil Engineering Department).

The Engineers Council for Professional Development has inspected and accredited the undergraduate programs in Aerospace, Chemical, Civil, Electrical, and Mechanical Engineering. The Professional Development Degree has been approved and is offered.

The Rolla campus operates a Graduate Engineering Center (GEC) in St. Louis on the campus of the University of Missouri-St. Louis. This is staffed with UMR engineering faculty. Some live in St. Louis, and others travel from Rolla to St. Louis for class sessions. The courses offered at the GEC are the same courses offered on the UMR campus, and the work done there is considered to be "work in residence". Degrees earned are awarded by UMR.

The numbers of degrees awarded by the School of Engineering are given in Table 10.

Table 10

Degrees Awarded by the School of Engineering

Degrees	66-67	67-68	68-69	69-70	70-71	71-72	72-73	73-74	74-75	75-76	76-77
B.S.	460	529	581	691	734	647	545	515	491	485	428
M.S.	100	148	146	203	328	310	178	177	178	182	158
Ph.D.	7	7	12	15	16	16	28	16	22	12	18

Enrollment

Enrollment in the School of Engineering has followed the national trend with a decline in the early seventies, but it is on the increase at present.

Class Enrollment data for recent years is shown in Table 11.

Table 11

Class Enrollment, School of Engineering

Date	Fresh.	Soph.	Jr.	Sr.	Masters	Ph. D.	Total on Campus	Total GEC St. Louis
1966	947	736	599	646	201	27	3156	400
1967	944	730	649	791	204	43	3361	503
1968	837	803	646	980	221	52	3539	731
1969	895	754	615	1060	264	69	3657	853
1970	946	618	603	989	319	67	3542	804
1971	659	584	612	804	259	73	2991	667
1972	543	506	515	769	180	75	2588	556
1973	509	417	475	700	173	65	2339	462
1974	605	378	462	652	173	57	2327	491
1975	736	474	465	587	214	50	2526	226
1976	862	562	520	625	173	54	2796	257
1977	882	614	578	743	152*	42	3011	209

*Includes 8 PDD's

Faculty Research Activities

All departments and a majority of the faculty therein are engaged in research as a part of the master and doctoral programs. In addition, separate organizational entities have been established for the purpose of specific interdisciplinary efforts toward the solution of problems within broad categories of study: The Center for Applied Engineering Management, The Environmental Health Research Center, The Electronics Research Center, The Institute for River Studies, The Engineering Research Laboratory, and The Transportation Institute.

Funding and grants for research projects often have time frames that do not correlate with the school year. Funds prorated for the year and assigned to the departments of the investigators are listed in Table 12.

Table 12

1976-77 Expenditure Data, School of Engineering

Department	Sponsored Research*	Other Sponsored Programs**
Dean's Office	-	$160,308
Chemical Engineering	$ 41,340	42,593
Civil Engineering	307,591	38,597
Electrical Engineering	249,692	4,306
Engineering Management	13,755	71,195
Engineering Mechanics	30,414	25
Mech. and Aerospace Eng.	239,705	25,760
TOTAL	$882,497	$383,784

*Direct costs only but includes the proration of research conducted in separately budgeted research centers. Indirect costs, although not included in these data, were recovered at a rate of 32% of direct costs.

**Includes sponsored instructional and departmental research, sponsored extension, and other sponsored programs.

Faculty Extension Activities

The extension activities of the School of Engineering are numerous, in-depth, and consist of a wide variety of offerings. They include off-campus credit courses, non-credit short courses and conferences, and individual and group instruction. In addition, there is consistent production of continuing education papers and slide presentations for the lay public.

Non-credit courses consist mainly of seminars, short-courses, and conferences. This is an important element of the School of Engineering's activities. Enrollment in these courses during fiscal year 1976-77 amounted to 9892 people for a full-time equivalency of 209.97 students. The School of Engineering at UMR has gained and is maintaining international recognition for the quality of its short course conference program.

The extension credit program of the School of Engineering consists of selected, formal credit courses given off campus. Enrollees for these courses are professionals whose backgrounds and credentials meet rigid standards. Graduate courses offered at the Graduate Engineering Center in St. Louis and other programs which have been offered to select groups in Jefferson City and Springfield are examples of the scope of this program.

Seventy-four credit courses were taught off campus last year to 82 undergraduate and 830 graduate students with a total student full-time equivalancy of 148.16.

In summary, the extension program of the School of Engineering is dynamic, expanding, effective, and needed throughout our technologically oriented society, especially here in the State of Missouri.

Other Faculty Activities

Virtually all engineering faculty members serve as academic advisors. Each advises a group of students the size of which makes the professor accessible to the student, without an encroachment on the time set aside by the faculty member for his other responsibilities. The advising of students is considered by the faculty members to be a prime responsibility, and efforts are constantly made to reinforce this concept. Students normally have the same advisor through their entire enrollment at UMR, but adjustments are made occasionally when it is felt that the students can benefit by changing advisors.

A faculty member is designated as a Principal Freshman Advisor by each department. These individuals are carefully selected to guide new students through their initial year, which is fraught with necessary adjustments on the part of most students. In addition, these advisors teach their particular department's orientation course to the freshmen so as to give them an overview of the subject matter they can expect to cover in pursuit of a chosen field. In addition, through a special communication arrangement with the Department of Mathematics, each Principal Freshman Advisor is notified immediately when an individual student begins to have difficulty in assimilating his initial mathematics courses.

Advising within the School of Engineering is viewed by the faculty as a professional responsibility, which emcompasses all facets of the students' development. Where necessity warrants, a student can be referred to the Counseling Center, where guidance and counseling are available for unusual or complex situations. In these situations, there is close interaction between the student, his advisor, and the counselor.

Many of the engineering faculty are active and take leadership roles in numerous professional and technical societies and make contributive efforts to the engineering profession by serving on a broad spectrum of national, state, and local committees. During the school year of 1976-77, 29 faculty members served on national (Government) committees, and 13 served on committees established by the State government. Thirty-six of the faculty

held office in national professional societies, 18 held office in state professional societies, and 13 held office in local chapters of national professional societies. Nineteen of the faculty served on national editorial boards reviewing journal articles and books, two served on a state editorial review board, and nine served in that capacity in local chapters. Also, during the same school year, 72 of the faculty served on national committees dealing with professional procedures, standards, and practices, and 11 served in that capacity at the state level. Virtually every faculty member at one time or another during the school year visits high schools, gives talks to civic groups, participates in local and regional science fairs, and in general makes a variety of public relations or service visits to public and private organizations.

Faculty within the School of Engineering also serve as advisors to student organizations, such as professional societies, honor societies, social fraternities, and the student council. These are all voluntary efforts, which require a great deal of time and dedication on the part of the individual faculty members.

Two expanding programs on campus are the Minority Engineering Program and the Women in Engineering Program. These programs are under the aegis of the Dean of Engineering, and members of the engineering faculty take active roles in them.

Strengths and Concerns for the Total Program

One notable strength of UMR's engineering program is bilateral understanding between the School of Engineering and the departments of Humanities and Social Sciences. All are fully aware of the human factor needs of the engineering students, and all interact and cooperate to shape a balanced program for them.

In general, the members of the engineering faculty are completely dedicated to good teaching at all levels, to research as an educational tool and as a vehicle for problem solving, and to extension and service as an outreach program to meet the requirements of industry and society.

The major problem area in the engineering program at UMR is directly connected to the funding situation. This is not unique in that dollars are the common denominator in gauging the success or lack of it in regard to many academic programs. Most certainly inflation, coupled with lagging appropriations, has forced curtailments and retrenchments, which have been difficult to accommodate. Maintenance and replacement of laboratory equipment have been problems, and the purchase of needed new equipment for teaching and research does not correlate with known and acknowledged needs. The press of additional enrollments will undoubtedly increase teaching loads and reemphasize equipment needs.

In spite of this problem, the School of Engineering is staffed by a well qualified, dedicated, and enthusiastic faculty, who are committed to developing the environment and facilities needed to support a quality engineering program.

SCHOOL OF MINES AND METALLURGY

Statement of Purpose

The primary goal of the School is to maintain accredited programs in the mineral, materials, and energy engineering disciplines of ceramic, geological, metallurgical, mining, nuclear and petroleum engineering so that its graduates can pursue successful and rewarding careers in the energy and mineral industries of the state and Nation. The academic programs at all levels must prepare students to interpret, apply, and develop technology for the solution of the engineering problems related to the management of the Nation's nonrenewable natural resources. These purposes are in the public interest and must be pursued through the education, research, and extension programs that challenge the participants to work at the forefront of the available technology and to use their imagination and knowledge to develop new technologies for the solution of societal problems. In the mineral, materials, and energy engineering disciplines, the goal of these programs today must be to prepare graduates to participate in the production of the nonrenewable resources that are so basic to the Nation's security, economy, and the standards of living of its citizens. Many of these reserves are continuing to decline in quantity and quality and must be recovered and processed with an appreciation and concern for the preservation of the environment, the efficient utilization of energy, and the recycling of materials.

History

The School of Mines and Metallurgy was established in 1870 to educate young adults for productive and rewarding careers in the mineral, materials, and energy engineering professions. Because of the magnitude of the Nation's present and projected energy and minerals problems, the faculty members of the School are dedicated to preserving and advancing these programs on the foundations so ably developed through the foresight of those who founded the institution. Inasmuch as the School is the only remaining one in the midcontinent region dedicated to mineral, materials, and energy engineering education, the objectives of the faculty are to build on the School's historical foundation and to serve those students of the state and the region who aspire to participate in the future management of the Nation's energy and mineral reserves for the benefit of all citizens and the national security. Of the some 6000 graduates of the School who are still active professionally, over 90 percent are associated with the mineral, energy, or materials industries, or with governmental or academic organizations concerned with energy and mineral reserve development and management. These graduates reside in all 50 states and in some 60 foreign countries. Their dedication to their profession has become a part of the School's tradition. Graduate education and research have also been part of the School's long tradition, which the faculty members have sustained as evidenced by the fact that over the years the graduate enrollment in the School has ranged from 15 to 20 percent of the total.

Function and Organization

The School consists of three academic departments: Ceramic Engineering, Metallur-

gical and Nuclear Engineering, and Mining, Petroleum, and Geological Engineering. The *chief* administrative officer of each department is its chairman; however, in the multidisciplinary departments he is assisted by a designated head for the discipline in which he does not hold a degree. The department chairmen render their administrative services on a part-time basis and devote the balance of their time to the teaching, research, and public service functions of their departments. The heads of the different disciplines within the departments are essentially full-time teaching and research faculty whose administrative services are rendered at the pleasure of the Dean.

The departmental chairmen are appointed annually, and they serve at the pleasure of the Chancellor on the recommendation of the departmental faculty, as communicated to the Chancellor by the School's Dean. Each chairman is primarily responsible for recruiting and evaluating the faculty of his department in consultation with the senior members of the staff; therefore, he initiates all recommendations relative to appointments, promotions, tenure, termination, and salary adjustments.

All faculty recommendations are subsequently reviewed for equity and appropriateness by the School Policy Committee, which consists of the three departmental chairmen, three heads of disciplines, and the School Dean. This Committee also develops and reviews individual and collective plans of the departments, allocation of funds, development of budget requests, facility utilization and maintenance, teaching loads and assignments, allotments from campus-wide fund allocations, curriculum and scholastic requirements, and faculty and student grievances.

Because of the limited number of faculty and the number of campus and University committee assignments, no standing faculty committees are appointed within the School. Ad hoc committees of the faculty are appointed to consider special problems as these arise; however, most of the faculty's contributions to matters of policy are made through weekly staff meetings within each of the six disciplines. The agenda for these meetings includes items referred to the groups by the School Policy Committee. Student contributions to the latter committee originate within the students' organizations (the several honorary and engineering societies) and are subsequently transmitted to the School Policy Committee via the faculty meetings within each discipline.

Instructional Programs

All six disciplines of the School are authorized to award bachelor of science, master of science, doctor of philosophy, doctor of engineering, and professional development degrees. All six bachelor of science curricula were inspected by the Engineer's Council for Professional Development in the spring of 1973, and in September the Council reported six-year accreditation for Geological, Mining, Nuclear, and Petroleum Engineering. Ceramic and Metallurgical Engineering received four-year accreditation with the provision that this could be extended to 1979 contingent upon the supervision of a report by November 1976 documenting that action had been taken to correct certain facility deficiencies. Accreditation of these two disciplines has been subsequently extended through 1979.

The degrees conferred over the past ten-year period are listed in Table 13.

Table 13

Degrees Conferred by School of Mines and Metallurgy, 1967-77

	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77
B.S.	54	54	78	83	82	86	104	108	121	137
M.S.	28	30	34	41	48	40	44	42	37	33
Ph.D.	7	10	10	9	17	11	5	10	9	6
D.E.	-	-	-	-	-	-	-	-	-	-

The enrollment of the School dropped about ten percent between the 1970-71 and 1971-72 academic years but has grown steadily since that time. The total enrollment in the fall of 1976 was 829, which is more than double the enrollment in 1971-72 and is the largest in the mineral, materials, and energy engineering disciplines in the history of the School. Present estimates indicate that during the 1977-78 academic year some 120 baccalaureate degrees, 40 masters, and ten doctoral degrees will be conferred upon graduates of the School. Based upon applications for admission on file at this time, the 1978-79 Freshman class should approach 180, another all time high for the School. Continued growth in enrollment is anticipated as increasing numbers of college bound youngsters recognize the career opportunities that have been made available in the mineral, materials, and energy engineering professions by the ever mounting demand for graduates in industry, government,and education.

Faculty Research Activities

The School's latest Faculty Activity Reports indicate that the average hours that the faculty members devoted to research each week were in excess of 23 hours. The graduate degree productivity of the faculty has averaged about 2.0 per full-time faculty member per year, and the graduate student/faculty ratio has been in the range of 2.5 to 3.0 for a number of years. For the past five years, the average yearly production of theses and publications has been 30 and 48 respectively, or approximately 1.0 thesis and 1.5 publications per Graduate Faculty member per year. The research activity of the faculty is further evidenced by the level of external funding it generates for support of research in the School. The total value of active grants in the School during the 1976-77 academic year was in excess of $1.5 million for an average value of active grant support in excess of $36,000 per full-time faculty member.

Faculty Extension Activities

Because of prevailing teaching loads and the level of effort devoted to research, there was the equivalent of only 2.0 FTE devoted to extension activities during the 1975-76 academic year, or approximately 6 percent of the total faculty effort. Five members of the staff were so engaged during the year. Two individuals offered credit courses in the off-campus

residence centers, one organized and presented three on-campus short courses in the use of remote sensing technology, one had an extension research grant to survey the nation-wide research needs of the mining industry, and the fifth served as the Extension Mining Industry Specialist on a part-time basis.

Other Faculty Activities

According to the latest Faculty Activity Reports, each faculty member of the School devoted an average of 10.5 hours per week to internal and external service activities, which include advising, administration, committee assignments, service to student organizations, service to regional and national professional organizations, and service to State and Federal agencies and the general public. During the 1977-78 academic year, each advised an average of 20 students. In some disciplines, the number was in excess of 35. On the average, each staff member served on 1.5 campus or University committees, and approximately one-third of the staff served as faculty advisors for student professional or social organizations. All members of the School's faculty are active in one or more regional or national organizations in their professional areas, and most hold offices or one or more committee assignments. Approximately one in eight holds the rank of Fellow in one or more organizations. Currently, four members serve on advisory committees to State agencies and another five on those of Federal agencies.

Because of its reputation, citizens of the state as well as the region direct inquiries to the School regarding the probable value of mineral specimens, problems of mineral rights, availability of minerals, mineral land values, royalty arrangements, potential and actual blasting damage and injury, need for technical witnesses, and many other related matters. The number of such inquiries has increased markedly in the past three years, and the best estimate is that on the average each staff member has responded to at least ten such inquiries during the current academic year. They provide technical opinions or suggest procedures or sources of pertinent information at no charge to the individual.

During the 1976-77 academic year, 80 percent of the faculty reported some consulting activity for an average of 94 hours. These activities are consistent with the long tradition of the School and contribute to the reputation it enjoys. They also effectively contribute to the placement of students, generate sustained funding from industry, provide technical currency for the faculty, and enrich the quality of classroom instruction and research.

Strengths and Concerns for the Total Program

The primary strengths of the total program of the School are to be found in the technical competence and dedication of its faculty; the quality, diversity of backgrounds, and scholastic performance of its student body; the quantity and quality of the Library holdings in mineral, materials, and energy engineering literature; the uniqueness of its academic programs in the state and region; the national and international reputation it enjoys as a consequence of the technical accomplishments and loyal support of its alumni; and the growing awareness on

the part of the Government as well as the general public of the need for better management of the country's nonrenewable energy and mineral resources.

The primary concern of the total program is the age and inadequacy of the facilities housing most of the disciplines and the School. The lack of adequate facilities has been a prime contributor to enrollment problems of the School during the last decade. Because of growth in enrollment during this decade, this deficiency is adding significantly to the work load of the faculty in that the lack of adequate numbers of student stations in instructional and research laboratories requires the scheduling of multiple sections and a disproportionate faculty effort to maintain equipment.

A secondary concern is the poor salary structure of the School as compared with those of other universities offering mineral, materials, and the energy engineering programs. The demand for faculty in these disciplines has exceeded the supply of qualified individuals for several years. As a consequence of these two factors, the School is losing its faculty and is unable to attract qualified replacements. Of the three vacancies resulting from resignations in the 1976-77 academic year, only one has been refilled to date. The net loss has led to student/faculty ratios of 30 to 1 and higher in four of the disciplines as compared with an average ratio of about 12 to 1 for the leading engineering school with which the School competes in terms of productivity and recognition for quality. Efforts are being made to alleviate this during the 1978-79 academic year in the form of a $300,000 improvement program to expand the numbers of teaching and research personnel.

Table 14

Fall Enrollment, School of Mines and Metallurgy

Year	Bachelors	Masters	Ph. D.	PB/PDD	Total On Campus	Total GEC St. Louis
1973	394	60	25	-	479	17
1974	399	80	25	-	504	13
1975	568	70	32	-	670	10
1976	693	65	27	-	785	16
1977	665	51	25	1	742	5

Table 15

1976-77 Expenditure Data, School of Mines and Metallurgy

Department	Sponsored Research*	Other Sponsored Programs**
Dean's Office	-	$138,191
Ceramic Engineering	$144,693	7,798
Metallurgical and Nuclear Eng.	82,700	19,540
Mining, Petroleum, and Geological Eng.	459,808	44,274
TOTAL	$687,201	$209,803

*Direct costs only but includes the proration of research conducted in separately budgeted research centers. Indirect costs, although not included in these data, were recovered at a rate of 32% of direct costs.

**Includes sponsored instructional and departmental research, sponsored extension, and other sponsored programs.

EXTENSION AND CONTINUING EDUCATION

The UMR Extension and Continuing Education Division was established on July 1, 1964, as a part of the Rolla campus reorganization within the four-campus system of the University of Missouri. On each of the four campuses, the chief administrative officer for Extension reports to the Chancellor of his campus. At UMR, the Dean of Extension and Continuing Education provides direction for the campus extension function, is responsible for all campus extension budgets, and maintains records pertinent to the reporting needs of the campus and the Vice-President for Extension. The Dean works with the appropriate campus deans for coordination of the extension activities on the Rolla campus and with the field staff and the other campuses of the University. Representing the Chancellor, the Dean is a member of the Extension Planning Council, the extension policy recommending group for the University of Missouri.

Since extension is a function of the academic departments, there is no separate campus organization for extension. Fitting into the departmental and school or college structure, faculty on partial or full extension assignment are responsible to the respective department chairman. The Dean of Extension's office supplies centralized academic support for accounting, budget analysis and recommendation, extension grants and contracts, and personnel for coordination of credit and non-credit programs.

Most of the UMR extension programs are presented by regular UMR faculty, but when non-regular faculty are used, they are approved and appointed by the appropriate academic departments on campus. For all credit courses offered as either individual off-campus courses or for off-campus degree programs, students are admitted and processed by the Registrar and Director of Admissions according to normal campus procedures and standards. For all non-credit offerings, admission standards are established by the department(s) academically responsible for the activity, and the student records are maintained by the Extension and Continuing Education Division.

Although all extension activities and student full-time equivalents are reported by department and school or college (see UMR Extension annual reports*), five general program areas for Extension have been established in the University of Missouri. For UMR, only four of these areas relate academically to Rolla and are discussed below. The fifth program area, Food and Fiber, is concerned with agriculture and is located academically on the Columbia campus of the University of Missouri.

Continuing Education for Professionals

The Graduate Engineering Center established in St. Louis in 1964 is the single largest continuing education program for UMR. The Director of the Center

*Appendix

reports to the Dean of the School of Engineering and chairs an advisory group of UMR's six academic deans. Starting in 1970, the Center had the same serious enrollment decline as did the campus, but last year the enrollment stabilized and reflected the general economic improvement of the St. Louis area. Including commencement in the fall of 1977, 863 M.S. and 13 Ph.D. degrees representing ten UMR disciplines have been granted through the Center, and the student head count for the fall semester of 1977-78 was 336.

In addition to those degree programs at the Center, M.S. programs in Engineering Management are in operation in Jefferson City, Springfield, and Fort Leonard Wood. The Springfield program is currently being phased down, and the possibility of starting a Professional Development Degree program is being investigated. Graduate courses in management and mining are presented in the Viburnum area for mining company personnel, but these courses are not a part of a degree program.

Intensive short courses and conferences for engineers and scientists continue to increase in number and have become a major portion of the total UMR extension activities. While most of these programs are held in Rolla, some are presented in St. Louis for the convenience of national and international travel or are located at an industry for in-house technical personnel. These programs on the professional state-of-the-art and research findings reflect the ability of UMR's faculty to relate to the needs of modern day technology.

Business and Industry

Although most of the students in the activities of the above mentioned program area are employed by businesses and industries, the educational offerings are designed to improve the proficiency of the individual professional and not the overall performance of the business or industry. The activities in this program are related to technical and management needs of small to medium size businesses and industries in the State of Missouri. Working with the business and industrial specialists in the field staff, UMR faculty members analyze industrial needs, develop and present educational programs relative to these needs, supply technical assistance for application of new technology, and prepare technical publications on industrial problems common to many industries.

The departments of Engineering Management and Civil Engineering supply the leadership for this program area with assistance from faculty in other departments on campus as needed. In 1976-77, Cooperative Extension Service funds became part of the UMR budget for this program area and the community-public sector. These Department of Agriculture formula funds will expand and solidify this educational assistance in the state. A new technical assistance program that has been piloted is energy conservation in industries. Funds now being sought from the Department of Energy should make this activity a significant portion of the business and industry program area.

The Center for Applied Engineering Management was established in January 1978. Funded through the Economic Development Administration, Small Business Administration, and Cooperative Extension, the Center will consolidate and expand the Engineering Management Department's technical assistance program for small businesses and industries.

Community-Public Sector

The Department of Civil Engineering works with city and county personnel on the technical aspects of local and regional problems throughout rural Missouri. Most of the communities in the rural area lack trained engineering and planning personnel, and the Department has been working directly with the elected and appointed officials to improve this situation and provide better services for the citizens of the state. The faculty members work with the community development specialists in the state in a manner similar to that described in the above program area. The Department of Engineering Management also supplies significant faculty effort, and other engineering departments participate as needed.

As indicated in the above program area, Cooperative Extension Service funds support this program and enhance the state-wide capabilities of the UMR extension activities. Energy conservation information and assistance is certainly needed by city and county officials and will be provided as part of the energy program described for business and industry.

Quality of Living

Activities in the extension area are designed for individual personal improvement and represent a fairly wide range of subject matter for a variety of audiences in both the credit and non-credit format. One large arts and sciences activity provides remedial courses in mathematics and English. These are followed by undergraduate credit courses that are offered by UMR and other educational institutions that serve the enlisted personnel of Fort Leonard Wood. Another significant activity developed for the youth of the Rolla area is a physical development program, which is conducted by the Department of Physical Education throughout the year and in a summer camp. Music programs are presented for the youth of south-central Missouri, and performing arts programs serve the educational needs of the adult population of the Rolla community. Summer institutes for high school students have been presented to explain career opportunities in specific disciplines. A series of offerings were designed for women entering the work force or desiring to improve their present employment status.

One of the most successful and perhaps controversial extension programs started seven years ago and was completed at the end of the 1975-76 fiscal year.

Working with the State Department of Corrections and the Vocational Rehabilitation Division of the State Department of Education, UMR attempted to develop a continuing education program for the inmates behind the walls of the penal system. UMR started by presenting credit courses. Gradually, other institutions of higher education became involved, and now Moberly Junior College and Lincoln University present the entire program with no input from UMR In addition, an education release program was established in Rolla with inmates living on campus and attending classes. This was an attempt to accelerate the course offerings such that a degree program was a real probability. This activity was phased out at Rolla and replaced by a day-release program on the Lincoln University campus.

Through the Joint Centers for Aging Studies, a four campus Gerontology program was established in the fall of 1977. The Department of Humanities has been given the responsibility of coordinating UMR's Gerontology program. Several grants now in operation are helping the Department develop new credit courses, research, and extension activities.

FURTHER EDUCATION FOR PROFESSIONALS

During the period 1973-75, the University administrators considered at great effort the conflict in purpose that exists between traditional graduate education and the type of continuing education that is needed in professional fields. As a result of these discussions, the University approved the concept of Further Education for Professionals and invited the campuses to propose appropriate programs. UMR's response was to propose a Professional Development Degree for engineers. The need for the degree on the Rolla campus was obvious after the 1972 visit of the North Central Accredition team. Traditional graduate objectives had become intermixed with continuing education goals to such an extent that it was difficult to document student selectivity in the graduate programs and required quality levels in the graduate courses. The Accreditation team recommended that not more than 25% of students in graduate courses should be unqualified on academic grounds to be regular graduate students.

Postbaccalaureate Admissions

In order to continue the necessary elements of continuing education, a new admissions level Postbaccalaureate classification (Post Bac) was instituted in 1972. Under this arrangement, students without completed admissions information and others not normally admissible by academic standards are admitted into this classification, which is not a part of the Graduate School. These students are eligible to participate in any learning experience open to them prior to the earning of the baccalaureate but are restrained from graduate (400-level) courses. Should later information, such as GRE scores, so indicate, admission to Graduate School is a possibility. This category has been particularly useful for engineers and teachers who though not admissible to Graduate School have needs for upper level courses. In past years, these students were admitted to the Graduate School as Special (course only) students. Many, however, chose to consider themselves as degree candidates, and there was no mechanism to restrain them from 400-level courses. Although this category is relatively new, in the spring 1977, 52 and 66 students, respectively, were enrolled at UMR and GEC. These students are counted as graduate level, because they are past the 120 credit mark but not graduate students.

Professional Development Degree

Like the M.S.T., which was first used for science and mathematics teachers, the P.D.D. is a flexible degree program that requires a planned 30-hour postbaccalaureate learning experience. It can be utilized as a first postbaccalaureate degree or a post-Ph.D. degree. Multiple degrees representing life-long learning are a possibility. Although UMR's earliest proposal was modeled after the M.S.T., the approved program resembles programs at Wisconsin, Michigan, and Nebraska.*

*Appendix

RESOURCES AND SERVICES

FACULTY RESOURCES

Numerous events have occurred since the last North Central visit that can significantly influence the Rolla campus of the University of Missouri in the years to come. Foremost among these has been the establishment of the Coordinating Board for Higher Education (CBHE) by the Omnibus Reorganization Act of 1974. The general charge to this board includes, "data collection, planning, program development, facilities inventorying, and coordinating higher education in all post-secondary institutions in Missouri, including technical/vocational activities in proprietary and other school delivery systems". * The CBHE is presently working on a Master Plan to coordinate educational programs and minimize duplication of effort among all Missouri institutions. It has established contacts with groups of faculty, students, and administrators for receiving information concerning the plan. The UMR faculty look forward to a positive influence being exercised by this board so that the limited financial resources for higher education can be effectively used. A dramatic increase in the number of institutions of higher education as well as expansion of programs has created a competition for funds such that the normal growth in State revenue has not allowed institutions to make even equitable inflationary adjustment, much less plan for improving and upgrading instructional areas. This financial situation is the one that most concerns UMR's faculty.

Another important event has been the adoption by the University of Missouri Board of Curators of an Academic Plan*, which defines the role and scope of each campus in the system. The need for this document and its philosophic statement is fully supported by the UMR faculty. It provides options for both short- and long-term planning that will greatly assist the allocation of resources to the campuses. The problem that has arisen here is again a financial one. Resources are not adequate to keep the structure viable as it is outlined in the plan. The members of the faculty feel that it is now imperative to look much closer at the program duplication on the various campuses with the idea that less-productive activities and programs be combined or eliminated to release resources for use in other areas. This subject is currently being discussed with both the campus and central administration, for it will require external assistance.

An item that is a problem of a local nature but is of great significance and concern is the enrollment pattern for the past five years. Enrollment decreased about 25% from a high of 6089 including the Graduate Engineering Center in 1970-71 to a low of 4381 in 1974-75. Many factors contributed to this. Among them were a down-turn in the economy, which decreased the demand for UMR's graduating engineers and scientists, an increase in the number of community colleges in urban areas, which made it possible for students to remain at home for their first two years of post-secondary education, a lowering of the total hours in the degree programs, and an increase in the out-of-state tuition. The largest factor, however, appeared to be the adverse publicity regarding space engineers. Had the Rolla campus not been part of a large system, emergency measures would probably have had to have been taken; however, because of the small

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percentage of UMR's budget compared to that of the entire system and because of the confidence of the central administration that the enrollment decline was temporary, UMR faculty and programs came through this period intact, with most changes being accomplished by attrition. The enrollment has passed through the nadir, and the on-campus component is near its peak. To continue this trend, a concerted effort is being made by both faculty and administrators to acquaint high quality students with the educational opportunities at UMR and with the value of the professional training that is offered here.

This period of low enrollment was not experienced without the generation of serious problems that must be faced. One has to do with the faculty. As a result of the rapid faculty growth in the late 1960's, UMR had a relatively young faculty, many of whom were tenured and promoted into the upper ranks. The recent attrition has mainly affected the younger faculty in the lower ranks. This leaves the departments with staffs (average age between 40 and 50) that are composed mainly of tenured faculty in the upper ranks. Thus, the salary and wage budgets are highly committed and allow little flexibility for either making cost-of-living salary adjustments or rewarding meritorious service. As might be expected, this creates problems both in morale and in having the campus keep its most productive faculty. Salary increases last year and hopefully this year will help to alleviate this problem.

Finally, during this period, there was a change in the chief administrative office at UMR. Dr. Merl Baker, after serving as Chancellor for just over nine years, left that position to become Special Assistant to the President on September 18, 1973. Dr. Dudley Thompson, then Dean of Faculties, served as Acting Chancellor during the period in which a search was made for a new chancellor. The search was culminated when Dr. Raymond L. Bisplinghoff, an internationally recognized scholar, engineer, and administrator, accepted the position and began serving in October 1974. The faculty felt fortunate in having secured the services of Dr. Bisplinghoff and looked forward to increased academic excellence and service to the state of Missouri under his leadership. However, as of January 1, 1977, the campus began searching for a new chancellor, because Dr. Bisplinghoff's resignation became effective on that date. Dr. Jim C. Pogue has since been serving as Interim Chancellor.

Governance (Academic Council)

The officers of the Academic Council for the academic year of 1977-78 are: Chairman, Dr. Wayne C. Cogell; Chairman-Elect, Dr. Delbert E. Day; Secretary, Dr. William A. Brooks; and Parliamentarian, Dr. Thomas B. Baird. They share with the administrators, faculty, and students in the responsibility for academic governance at UMR, as provided in the official Bylaws* approved by the University of Missouri Board of Curators. The Bylaws provide for the establishment of such an Academic Council, which can represent the total faculty.

*Appendix

The Council consists of 56 members; 47 have voting privileges. Of the voting members, 38 are departmental and nine ex-officio. All academic departments have at least one representative. Additional representatives are allowed, depending on the number of departmental faculty. The representatives are elected by their departments. The non-voting members consist of five student representatives (one graduate and four undergraduate), and four administrators: the Business Officer, the Librarian, the Registrar, and the director of the Computer Center.

There are 14 faculty and six administrative standing committees, all of which report to and through the Council. All contain strong complements of faculty, and most have student representation. The students on the committees have equal voice and voting privileges. These committees perform most of the routine assignments of campus-wide nature and recommend new policies or policy changes in their areas of responsibility.

A salient feature of the Council is that the committee work is centered around a large and relatively open body of campus representatives rather than closed administrative groups. The standing committees are composed of members drawn from across the campus and from the Academic Council membership. This allows a much larger group of campus personnel to participate in campus governance.

The right of all faculty members to attend and observe Council meetings and to petition the Council on problems of concern to faculty and/or students, the campus-wide distribution of the Council agenda before meetings, and the distribution of the Minutes of the meetings to all faculty and administrative offices are important factors in campus communications, which were highlighted as a campus problem in 1972.

The official University of Missouri - Rolla Faculty Bylaws* will be available for inspection by the North Central Association task force and can be consulted for a more detailed description of the campus organization for governance. Several procedural resolutions (also available) have been adopted by the Council to facilitate operation.

The departments and schools are organized to take care of operations at their respective levels. Minimal descriptions of organization, membership, and operation can be found in the official Bylaws. These groups have devised their own systems to carry out their responsibilities and solve problems insofar as possible.

Items of a multidisciplinary nature are solved at the lowest level representing all groups concerned.

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Recruitment and Affirmative Action

The University of Missouri - Rolla is firmly committed to the policy that discrimination on the grounds of race, religion, sex, or national origin will not exist in any area of the University. It supports the preposition that equal opportunity shall be provided for all employees and applicants for employment on the basis of their ability and competence.

Administrative officers (deans, directors, departmental chairmen, and other supervisory personnel) are responsible for the implementation of the Equal Employment Opportunity Program within their functional areas of responsibility and for evaluating their subordinates on the basis of performance.

Equal Employment Opportunity and Affirmative Action Officers for the University of Missouri - Rolla are: J. C. Pogue, Interim Chancellor, formerly Provost/Dean of Faculties, for teaching and research; J. J. Dills, Personnel Officer, for administrative service and support; and P. E. Ponder, Dean of Student Affairs, for students.

The campus Equal Employment Opportunity Officers are responsible for establishing guidelines and timetables for implementation of the campus' Affirmative Action Program. The guidelines and time schedules include areas that need special attention and the action necessary to discharge the responsibilities of the program and the time schedule in such a manner as to achieve the required results.

Greater emphasis is being placed on recruitment because a lack of qualified minority and female applicants in certain occupational groups has been the major stumbling block in meeting the affirmative action goals. UMR is primarily a technological institution with major disciplines in engineering and science, areas that have graduated fewer qualified females and minorities than the disciplines in liberal arts. This is detrimental to the campus in the recruiting of academic staff in the engineering and science fields. It is, consequently, a major goal of the campus to correct this detriment by putting forth special efforts to recruit and retain minority and female students for these disciplines.

Recruitment of new faculty members normally occurs at the departmental level. Prior to the initiation of a search for a new faculty member, a form titled "Request to Fill Academic Vacant Position" must be initiated by the department, signed by the Dean, and approved by the Provost/Dean of Faculties. The approval by the Provost/Dean of Faculties accomplishes two things: alerts campus control of budget allocation and provides information for the teaching and research equal employment opportunity officer concerning positions for which a search process has been approved. The recruitment process carried on by a department must include efforts to identify minority and female candidates. Prior to making an offer to a prospective new faculty member, the hiring unit must complete a "Summary of Affirmative Action" statement, which is signed

by the department chairman, the appropriate Dean, and approved by the Provost/Dean of Faculties (teaching and research equal employment opportunity officer). This form must provide a description of the special efforts made to identify minority and female candidates. If members of minority groups and/or women were not seriously considered for the position, the approval form must provide an explanation of why none were considered. If such candidates were seriously considered for the position but rejected, an explanation of each rejection must also be provided.

Promotion and Tenure

Promotion and tenure have been areas of major concern to the UMR faculty. Particular items of concern have been: 1) uniform and published criteria that recognize all aspects of faculty service, 2) a uniform and published procedure for handling recommendations, 3) the right of candidates to participate in compiling and/or inspecting dossiers accompanying recommendations, 4) the participation of peer groups in the process, 5) the right of candidates to be informed of the reasons for unfavorable decisions, and 6) the right of individuals to appeal unfavorable decisions to higher authority.

Two actions have been taken in recognition of these concerns. First, Policy Memorandum No. 16, "Qualifications for Professorial Academic Ranks"*, has been formalized and distributed to all faculty. Second, a detailed directive, "Procedures for Promotion and/or Tenure Recommendations"*, has been formalized and distributed to all the faculty. These two documents speak to all of the concerns listed above. In their present form, they have received both Academic Council and administrative approval. Some difficulties did arise in informing candidates of reasons for unfavorable decisions and in the appeal procedures, but these have been corrected. Otherwise, the system is operating satisfactorily at the present time.

Characteristics of the Faculty

A ten-year summary of UMR faculty headcount is shown in Table 16 for the total number, the number and percentage holding professorial rank, and the number and percentage with the Ph. D. degree. The total number of faculty reached a maximum in 1970-71 and corresponded to the peak enrollment of students. Since that time, this number has decreased about 18%. These values have been relatively stable during the past five years. The faculty members have received their Ph. D.'s from different institutions, mainly throughout the United States and Europe. These are shown in Table 17. A detailed ten-year Faculty Development Report is available for review by the North Central Association task force. *

*Appendix

Table 16

UNIVERSITY OF MISSOURI - ROLLA

1968 - 77

TEN-YEAR FACULTY DEVELOPMENT REPORT

Summary

Compiled as of October 1977

Column No.		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Acad. Yr.	Total	Departmental		Professorial				Ph. D.					
	(a) No.	(b) No.	(c) FTE	(b) No.	(d) %	(c) FTE	(e) %	(f) No.	(d) %	(g) %	(c) FTE	(e) %	(h) %
68-69	363	353	454.15	292	82.7	293.98	64.7	226	64.0	77.4	227.82	50.2	76.5
69-70	396	386	486.73	316	81.9	317.58	65.2	245	63.5	77.5	247.74	50.9	78.0
70-71	401	389	502.06	336	86.4	337.80	67.3	273	70.2	81.3	265.55	52.9	78.6
71-72	399	386	493.20	353	91.5	354.05	71.8	293	75.9	83.0	294.25	59.7	83.1
72-73	381	370	473.68	341	92.2	342.55	72.3	298	80.5	87.4	290.08	61.2	84.7
73-74	366	354	508.35	332	93.8	334.15	65.7	282	79.7	84.9	284.10	55.9	85.0
74-75	349	338	488.70	316	93.5	316.80	64.8	269	79.6	85.1	269.30	55.1	85.0
75-76	350	337	509.89	317	90.6	317.19	62.2	273	81.0	86.1	273.99	53.7	86.4
76-77	344	332	504.00	308	92.8	308.25	61.2	268	80.7	87.0	265.31	52.6	86.1
77-78	327	317	492.65	298	94.0	298.50	60.6	255	80.4	85.6	256.63	52.1	86.0

Notations:

(a) Total full-time academic and administrative head count
(b) Full-time head count
(c) Total full-time equivalent (FTE) teaching and research, includes part-time and graduate assistants
(d) Using column (3) as denominator
(e) Using column (4) as denominator
(f) Full-time Ph. D. head count
(g) Using column (5) as denominator
(h) Using column (7) as denominator

Table 17

Colleges and Universities from which UMR Faculty Members Received their Ph. D. Degrees

Alfred University, 1
Arizona State University, 2
Arkansas State University, 1
Brigham Young University, 1
California Institute of Technology, 1
Case Western Reserve University, 2
Central Missouri State, 3
Charles University, 1
Cincinnati, 1
Cleveland, 1
Colorado School of Mines, 2
Colorado State University, 3
Columbia University, 1
Cornell, 6
Florida State University, 2
Geottingen, 1
Harvard University, 2
Indiana State University, 8
Iowa State University, 18
John Hopkins University, 2
Kansas State College, 2
Kansas State University, 8
Lehigh University, 1
London College, 1
Louisiana State University, 2
Massachusetts Institute of Technology, 4
Michigan State University, 1
Milano University, 1
New York University, 2
Northwestern University, 2
Norwegian Institute of Technology, 1
Ohio State University, 7
Oklahoma State University, 8
Oregon State, 1
Peabody College, 2
Pennsylvania State, 4
Purdue, 13
Rensselaer, 2
Rice University, 3
Rutgers University, 1
South Dakota State, 2
Southern Illinois University, 1
Stanford, 1
Stockholm University, 1
Syracuse University, 1
Texas A & M University, 7
Texas Tech University, 1
Tulane University, 1
University of Alabama, 2
University of Arkansas, 8
University of Arizona, 1
University of Belgrade, 1
University of Berlin, 1
University of California, Berkeley, 3
University of California, Los Angeles, 2
University of Chicago, 1
University of Cincinnati, 3
University of Connecticut, 1
University of Delaware, 2
University of Denver, 1
University of Florida, 2
University of Georgia, 1
University of Illinois, 18
University of Iowa, 8
University of Kansas, 6
University of Kentucky, 2
University of Leeds, 1
University of Maryland, 3
University of Massachusetts, 1
University of Michigan, 4
University of Minnesota, 6
University of Missouri - Columbia, 29
University of Missouri - Rolla, 38
University of Nebraska, 2

*The list is representative of 1977 fall semester faculty

Table 17 (cont.)

University of Nevada, 1
University of North Carolina, 1
University of Oklahoma, 5
University of Paris, 1
University of Pennsylvania, 3
University of Pittsburgh, 2
University of South Dakota, 1
University of Southern California, 1
University of Tennessee, 1
University of Texas, 6
University of Utah, 5
University of Virginia, 1
University of Washington, 2
University of Wisconsin, 7
University of Wyoming, 1
Vanderbilt University, 2
Virginia Polytechnic Institute, 2
Washington State University, 13

Faculty Salaries

Table 18 shows a summary of faculty salaries and headcount in the various ranks for 1970-71 and 1977-78. It is obvious from these numbers how attrition has been concentrated in the lower ranks. One can also note that faculty salaries have risen about 3% to 5% per year during this period. These salaries presently rank in the lowest 20 percentile of the averages compiled by AAUP and are of great concern to the faculty and administration; however, it should be noted that the salaries do not necessarily reflect total compensation. In some cases, faculty having research grants can earn up to one-third of their nine-month salary during the summer months.

At present, approximately 89% of the faculty members at UMR are tenured. This varies from a high of 100% in some departments to a low of 30% in others.

Detailed statistical data, including salaries and tenure status, on current faculty members* will be available for inspection by the North Central Association task force.

Table 18

Salaries for UMR, Full-Time, Nine-Month Faculty

	1970-71				1977-78			
Rank	No.	High	Low	Average	No.	High	Low	Average
Professor	81	23,400	12,100	17,873	121	31,575	18,400	23,527
Associate	133	18,500	10,000	14,618	128	22,950	13,900	19,305
Assistant	121	15,000	8,500	12,625	38	18,650	9,500	15,732
Instructor	45	15,000	7,500	9,824	17	14,150	9,000	11,970

*Appendix

Retirement and Staff Benefits

The detailed data on the University's retirement program and staff benefits that are summarized below are available for review by the Committee*.

Benefits--Retirement, Disability, and Death. The University's retirement plan is for the full-time staff and any member on part-time service who is required to give 1500 or more hours in a year to the performance of services. The staff member makes no payments into the plan either directly or through payroll withholding. If a staff member leaves his University position before reaching retirement age, he cannot retain any retirement benefit unless at the time he leaves he is at least 35 years of age and has been on the University staff for ten years. The staff member's retirement amount is based upon a percentage of his average annual salary during the five best consecutive years of the last ten and upon his years of service to the University. Compulsory retirement age is 70, with provisions for retirement at 65 with full benefits or 55 to 65 with reduced benefits.

Coupled with the retirement plan are provisions for disability and death benefits. A special booklet titled University of Missouri Retirement, Disability and Death Benefit Plan is available through the Staff Benefits Office.

Credit Union. University employees operate a credit union under authorization granted by the Board of Curators. Programs for both savings and loans are available.

Membership in the credit union is open to all employees of the University. Detailed information can be obtained from credit union representatives on each of the campuses.

Educational Assistance. Full-time permanent teaching and research staff (academic) and full-time permanent administrative, service, and support staff (non-academic) employees may register for not more than six credit hours per semester (three hours for summer session) of courses beyond the secondary level.

Those appointed on a full-time nine-month basis, however, may enroll for not more than the maximum number of hours allowed by that campus during the summer session, provided they do not hold an appointment for the summer session.

Employees enrolling under the Educational Assistance Program will receive credit for courses and will pay 25 per cent of the normal incidental fee when enrolling but will pay the normal amount on all other fees.

No incidental fee is required if the employee audits courses on his own or at the request of the department head. Permission to audit a course, however, must be granted the employee by the instructor in charge. Such attendance will be without enrollment or record.

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*Appendix

Employee Representation. As a matter of policy, the Board of Curators recognizes two regularly organized and established labor unions for the University of Missouri to represent those non-academic employees--except clerical and administrative personnel--who individually elect in writing a desire for either of such unions to represent them.

Insurance Programs. Several insurance plans are available to full-time staff members. They include Group Life Insurance, Long Term Disability Insurance, and Accidental Death and Dismemberment Insurance.

All academic and non-academic employees of the University, both full-time and part-time, are also extended Workmen's Compensation coverage. The determination as to whether medical expenses and compensation are payable and the amount and the duration of such payments are prescribed by State or other statutes and not by the University or the insurance company.

Medical Program. A Medical Benefits Program is available to all full-time employees of the University.

Coverage is offered the employee and his immediate family dependents on a medical expense reimbursement basis. Various types of coverage are available.

Sick Leave. Members of the non-academic staff employed on a full-time or appointment basis are entitled to twelve working days sick leave per year of completed continuous employment. When a new employee completes a period of continuous employment of six months, paid sick leave is credited to him retroactive to the date of his employment.

Social Security. University employees participate in the Federal Social Security Program. Deductions, specified by Federal Regulations, are withheld from employees' monthly paychecks. The University likewise makes regular contributions to the Social Security system in behalf of all University employees.

Tax Sheltered Annuity. The University offers to its full-time staff members a Tax Sheltered Annuity Program.

Under the program, the employee may authorize the University to set aside a portion of his salary for the purchase of annuities. The Internal Revenue Code provides that the amount set aside will not be subject to Federal income tax until such time as payments are made to the staff member under the annuity contracts.

The amount which the employee is permitted to set aside under the program varies in accordance to his salary and years of service. The minimum amount is $25 per month.

Sabbatical Leaves

Sabbatical leave may be granted to teachers with the rank of Assistant Professor or higher rank and to administrative officers who have served six or more years at UMR. The term of such leave is normally one full year at half salary. Under special circumstances, one semester leave at full salary may be granted.

The following list shows sabbatical leaves granted during the period 1972-78. The institution or area in which the leave was taken is also shown.

1972-73

Roach, D. Vincent; Chem.	Massachusetts Institue of Tech. and UMC
Gillet, Billy E.; Comp. Sci.	Washington State University
Law, David A.; Hum.	Volgograd Pedegogical Institute, U.S.S.R.
Oetting, Robert B.; Mech. Eng.	vonKarman Institute, Belgium
Kreidl, Norbert J.; Cer. Eng.	Vienna, Austria (Fulbright International Travel)
Morris, Arthur E.; Met. Eng.	Lawrence Livermore Laboratory
Bolon, Albert E.; Nuc. Eng.	Union Electric, St. Louis, Mo.
Christiansen, Carl R.; Mining	Wide travel including the United States, Canada, and Sweden.

1973-74

Gerig, Frank A.; Civil Eng.	Various in-country travel.
Proctor, Paul Dean; Geol.	Ankara, Turkey
Wise, James, N.; Hum.	California
Oakes, Robert A.; Hum.	Oxford University, England
Cain, Marvin; Soc. Sci.	Washington D.C., Baltimore, St. Louis, Columbia, and Ann Arbor.

1974-75

Nelson, Harlan F.; Aero. Eng.	Jet Propulsion Laboratory, California
Ownby, P. Darrell; Cer. Eng.	Max Planck Institute, Stuttgart, Germany
Wulfman, David S.; Chem.	Paris, France
Nygaard, Kaare J.; Phys.	FOM Institute, Amsterdam, Netherlands
Eisenman, Harry J.; Soc. Sci.	Eastern United States
Montgomery, Robert L.; Soc. Sci.	Gainesville, Fla.
Mayhan, Kenneth, G.; Mat. Res.	Edwards Laboratories, Santa Ana, Calif.

1975-76

Tracey, James H.; Elec. Eng.	Eindhoven Univ. of Tech, The Netherlands
Bertrand, Gary L.; Chem.	University of California - Davis
Bledsoe, Wayne M.; Soc. Sci.	Various in-country
Carstens, John C.; Phys.	Sydney, Australia
James, William J.; Mat. Res.	France, South Amsterdam, The Netherlands

1976-77

Crosser, Orrin K.; Chem.	Great Britain and France
Edwards, Doyle R.; Nuc. Eng.	Various in-country
Scott, James J.; Min. Eng.	Various in-country
Ho, Chung Y.; Comp. Sci.	Renssalaer Polytechnic Institute, Troy, N.Y.
Walker, Emma J.; Engl.	Various in-country
Patrick, Michael D.; Engl.	England and various in-country
Alexander, Ralph W., Jr.; Phys.	Cornell Univ, Ithaca, N.Y.
Oster, Donald B.; Hist.	Various in-country

1977-78

Gaddy, James L.; Chem.	Swiss Federal Institute of Tech. Zurich, Germany
Guhse, Edwin J.; Eng, Tech.	Tunghai, Univ, Taichung, Taiwan
Sorrell, Charles A.; Cer. Eng.	Aberdeen Univ., Aberdeen, Scotland
Dolan, Thomas J.; Nuc. Eng.	National Tsing Hua Univ. Taiwan, Republic of China
Rechtien, Richard D.; Geol.	Dallas, Tex
Tang, Min M.; Math.	Univ. of Arizona, Tucson, Ariz.
Schearer, Laird D.; Phys.	Univ. of Colorado, Boulder, Colo.
Hill, Otto H.; Phys.	Fullbright Hayes Fellowship, Turkey
Snow, Wm. R.; Phys.	Rice Univ., Houston, Tex.

ADMISSIONS AND REGISTRATION

The activities of the Director of Admissions and Registrar are divided into eight areas of responsibility: 1) Admissions, 2) Registration and Records, 3) Computerized Student Information System, 4) Scheduling, 5) Public Relations, 6) Special Campus Responsibilities, 7) Veterans, and 8) Four-Campus Cooperation.

Admissions

This area of responsibility involves the processing of all admissions: undergraduate students and transfer students from other colleges and universities as well as postbaccalaureate, professional development degree, masters, and doctoral level students. Additional responsibilities include not only regular day-school students but evening students, extension credit students throughout Missouri, and students enrolled at the UMR Graduate Engineering Center in St. Louis. Admission of foreign students is coordinated with the Office of Student Personnel through the foreign student advisor. The University of Missouri policy for the admission of first time college students is available for review*.

Registration and Records

Registration of all undergraduate and graduate students and off-campus students covered by Admissions is handled through this section. Responsibilities include the issuance of transcripts, certification of work completed, processing withdrawals, centralized checking of all graduation requirements for all degrees conferred by UMR, student counseling of a general nature, which in many cases consists of a referral to either the Counseling and Testing Center or an academic office on campus, maintenance of all academic and student personnel records, and issuance of all diplomas. All enrollment statistics are maintained in the Office of Admissions and Registration. A copy of the Fall '77 CBHE Enrollment Report* is available for review.

Computerized Student Information System

UMR participates in a University of Missouri, four-campus, user driven, computerized Student Information System. This area of responsibility involves data collection, coding, and input of data into the University's Computer Center on the Columbia campus. The output which is received in Rolla, forms the machine records system for admissions, registration and records, and scheduling.

Scheduling

This area of responsibility entails the scheduling of classes offered each semester, the assignment of classes to classrooms, the arrangement of meetings for classrooms during the daytime hours, and the scheduling of final examinations for all semesters and sessions.

*Appendix

Public Relations

Much of the work in the area of public relations involves contacts with high schools, junior colleges, four-year colleges, and other universities. To a large extent, all the members of the office staff are involved in public relations with the general public, alumni, and prospective students. Part of the responsibility requires public relations for special events on and off campus and necessitates the distribution of bulletins and other UMR publications.

Special Campus Responsibilities

The office personnel serve as members and secretaries on various campus and central administration committees. The Registrar serves as secretary for the general faculty and provides assistance to the faculty, students, and administrators on a variety of projects. Data for institutional research are usually supplied by the Office of Admissions and Registration and furnished to other offices on campus as required. All of the general mail addressed to UMR is processed through the office and is either referred to another office on campus or is answered directly.

Veterans

All veterans enrolled on or off the UMR campus are certified by the Office of Admissions and Registration.

Four-Campus Cooperation

The directors of Admission and the Registrars from each campus form a staff group, which is responsible to President Olson and the central administration. This group works closely with the University-wide Office of Institutional Research, and its members serve on various special and ad hoc committees when called upon.

Strengths and Concerns

A major strength of the Office of Admissions and Registration is that all phases of student admission are handled in the one office where coordination can be maximized. Centralized graduation checking is an asset for both the faculty and students.

The office previously had sufficient resources to maintain its responsibilities, but with last year's increased enrollment and this year's anticipated increase in enrollment, the office is barely able to meet the demands particularly in the areas of admissions, public relations, and student information.

Previously, the Director had direct contact with and access to the Chancellor, which was a decided strength, but through a recent reorganization this arrangement

was terminated, and it has since proven detrimental to the operation of the office.

The present space allocation for the office is being utilized to the limit, and additional space is needed immediately.

The total mission of the office is assisted and enhanced by its close working relationship with the faculty and students. This cooperation is made possible because of the open channels of communication and coordination with the offices of Student Financial Aid and Student Personnel, the departmental chairmen, the Counseling and Testing Center, and the director of the Minority and Women in Engineering Programs.

LIBRARY SERVICES

Description and Scope of Services

The UMR Library is considered the prime learning resource center on the Rolla campus. Its major objective is to provide materials to support and reinforce the University's academic program. However, in addition to serving students and faculty, the UMR Library also provides limited library services to the U. S. Bureau of Mines, the U. S. Geological Survey, the Missouri Department of Natural Resources, and the general public.

The Library is known for its strong collection in science and technology, but great growth in the humanities and social sciences collection has occurred as the library acquires materials to support developing programs in these areas. Further efforts have been made to strengthen the collection with bibliographic source materials and periodical abstracts and indexes in all fields.

The members of the faculty have taken an active part in the development of the collection and have firmly supported the Library's efforts to achieve a consistent level of funding. Special funds play an important role in the acquisitions policy. Endowment funds, such as the Dougherty Library Fund, and Government grants and gifts to the Library have helped in recent years to offset the increasing cost of periodical subscriptions and indexing and abstracting services and to allow for the purchase of major works.

A new, modern library was opened in 1968. At that time, the collection consisted of 128,000 volumes. Today the Library houses nearly 300,000 volumes and microforms and currently subscribes to over 2000 periodicals. The working capacity of the Library is 250,000 volumes, which should be adequate for three years. With increased use of microforms, judicious weeding, and off-campus shelving, the capacity could be increased to 400,000 volumes.

The library is open 90 hours per week and is substantially used. The loan policy is a liberal one, and the circulation of material is active. Annual circulation is approximately 32,500. There is seating for over 800 users. Desks and tables are located on all four levels to give easy access to the open stacks. Twenty-five individual study rooms provide students and faculty with quiet, private places to work. Although the majority of the study rooms are assigned by the semester or academic year, three rooms are set aside for use on a day-to-day basis. Both electric and manual typewriters are available as are inexpensive photocopy machines.

There has been a concerted system-wide effort to improve and speed interlibrary loan service and to achieve greater cooperation and coordination in the use

of resources. Interlibrary loan is an important service to students and faculty. It is seen as a supplement to rather than a substitute for an active acquisitions program. Microfilm copies of the four Missouri campuses' card catalogs constitute a valuable tool for quickly locating materials within the system. Daily courier service links the four campuses and Washington University in St. Louis.

Individual departments at UMR traditionally have provided their own audio-visual equipment and teaching aids; however, since 1976, the library has offered limited audiovisual service as an adjunct function. The service supplements departmental resources and provides equipment and materials for nondepartmental programs. Use of both equipment and materials has been increasing steadily.

Summary of Strengths, Concerns, and Progress

The UMR Library rates an "A" in space for users and materials according to standards published by the Association of College and Research Libraries, but is deficient in both quantity of collections and quantity of staff by these same standards. Legislative requests for 1978-1979 reflect concern on the campus and University-wide for libraries. UMR has requested substantial additional funding for staff and collections and will continue to stress adequate funding for library operations. Library funding has been gradually increasing, and a reference staff was added during 1977-1978 largely through better utilization of existing staff.

Interlibrary cooperation has significantly increased since the last North Central Accreditation visitation. Seventy-five percent of all interlibrary requests are satisfied; the mean time for each transaction is about ten days. UMR Library now cooperates with and contributes to the Missouri Union List of Periodicals and enters and modifies holdings on-line through a local terminal. Computerized literature searches are now provided by way of a service offered at University of Missouri - Columbia and will soon be provided locally. Funding for joining the OCLC network for cooperative cataloging and interlibrary loan is a component of the 1978-1979 legislative request as well.

Through these efforts, library services have greatly improved at UMR over the last few years.

COMPUTER SERVICES

UMR Computer Center

The UMR Computer Center was established in February 1960 to provide computing services for all students, faculty members, and staff on the Rolla campus. The Center is located on the ground floor of the Mathematics-Computer Science (MCS) building, a facility especially designed for the computing service function. The administration of the Center is independent of any particular academic department, although some members of the staff have academic titles in the College of Arts and Sciences. The Director of the Computer Center reports to the Provost/Dean of Faculties.

The UMR Computer Center IBM 360/50 Computer System is now an integral part of two computer networks. One, the University of Missouri Network, provides for large volume instruction, research, and administrative processing on an IBM 370/168-158 Computer System for all branches of the University. For this purpose, the UMR IBM 360/50 functions as a remote workstation controlling the operations of card reading, data transmission, printing, punching, and plotting. Normal instruction and research work are run on the University of Missouri IBM 370/186-158 System. In addition, the UMR IBM 360/50 serves as the host or central processor for a campus network of laboratory minicomputers. Its purpose is to provide for the unique research needs associated with the Rolla campus. The UMR Computer Center serves as the interface between Rolla campus users and the University of Missouri Computer facilities and provides special computer services for instruction, research, and administrative processing. Most of the members of the professional computer staff have advanced degrees in Computer Science or closely related fields and have had extensive experience working on academic projects and administrative data processing systems.

Computer Educational Services Laboratory

This "user oriented" laboratory facility is available to classes and laboratory groups or individuals for "hands on experience" with sophisticated computer hardware. The main computer equipment room contains six Data General Nova minicomputer systems and an IBM 360 Model 50 computer for the study of interactive graphics techniques, data acquisition methods, solution of mathematical problems, data communication interfaces, and a wide range of engineering design applications.

Students and faculty using the laboratory have the advantage of working in large groups on a common project, because they have access to multiple minicomputer systems with compatible hardware and software. The faculty members are able to supervise their student activities better and assign more interesting projects without devoting too much of their time to individual sessions.

Eight Data General Nova 800 computer systems, which are linked together to form the UMR minicomputer network, are interfaced directly to the IBM 360/50. This Rolla cam-

pus network supports research and instruction in interactive graphics, data acquisition methods, engineering design applications, data communication interfaces, and data transmission techniques.

A detailed description of the computer services, equipment, and software available and staff functions is contained in the current UMR Computer Center User's Guide.*

*Appendix

STUDENT AFFAIRS

Student Body

Although UMR retains much of its historical orientation toward engineering and the physical sciences with about 92 percent of its total enrollment of 4881 being concentrated in these curricula, additional course offerings in the liberal arts and social sciences in the past decade have developed a greater degree of diversity among the students. The increase in the number of women students to the present level of 756 (16 percent) is a significant result. This increase was originally stimulated by the new degree programs, but an increasing number of women have been enrolling in the engineering, physical, and computer sciences, a trend which is expected to continue for several years. Minority student enrollments, primarily black students, have also increased significantly to about 175 students. Most of these are in engineering. Approximately 400 international students from about 40 foreign countries are enrolled. Since the enrollment decrease in the early 1970's, there has been a steady increase in each of the past four years, and this is expected to continue for the forseeable future. About 1000 new freshmen students and over 300 new transfer students are expected to enroll next school year. The present graduate student enrollment is about 720. This includes 424 on campus, 265 at the UMR Graduate Engineering Center in St. Louis, and 30 others in Extension.

University dormitories house about 1050 men and 150 women. An additional 140 students have been housed this school year in temporary housing facilities leased by the University. The University provides 66 apartments for married students. Fraternities house about 1100 students, and two sororities provide housing for about 70 women. The remaining students live in private homes in or around Rolla. Housing has become a problem within the past two years and may continue to be one. There are no plans to build additional University housing units, because present construction costs are excessive and enrollment trends over the extended period required to retire the building bonds are uncertain. However, there may be some units added within the private sector if a sufficient need becomes evident.

Background and Philosophy

The present organization, which administers student affairs, is the result of an administrative reorganization in 1974. A Dean of Student Affairs was appointed at that time, and more authority and responsibility for the administration of the Student Services program were assigned to that position. The Dean is administratively responsible to the Chancellor, but most administrative actions require coordination with the Provost/Dean of Faculties, the other campus deans, the Business Officer, and the faculty. The Dean is a member of the Chancellor's Council, the Committee of Deans, and the Academic Council. The Dean and other members of the division's staff also serve on a number of campus committees. Relations with the central administration

of the University system and coordination with the other campuses are maintained through membership of a campus faculty member, the President of the Student Council, and the Dean who is on the University Committee on Student Affairs.

The primary function of the Student Affairs Division is to provide those services and activities that lie outside the formal instructional program and are considered necessary or desirable by the students, faculty, and administrators. These services and activities are conducted within the framework of the regulations of the Board of Curators and the rules of the faculty. The Division's basic services and activities change relatively slowly but are sufficiently flexibile to provide for variations in specific student interests from year to year. Student initiative is sought in determining both short- and long-term program changes. Although changes in the nature of the student body during the past decade have been reflected to some degree in the general interests of the students, the diversity in enrollment has not yet been reflected in significant changes. However, the Student Affairs staff is aware of the possibility or even likelihood that such changes will occur, and it remains alert to the need for change if student interests change.

A second function of the Division is to work with the students, the faculty, and the administrators to learn more about the students so that all the campus programs can serve them better.

Organization

The Student Affairs Division includes a variety of administrative units. Each has its own director who is responsible for a specific program. These are: the Athletic Department (intercollegiate and intramural athletics), the Cooperative Program Coordinator, the Counseling and Testing Center, the Placement Office, the Office of Student Financial Aid, the Student Health Service, and the University Band. The Dean of Student Affairs does not directly administer but does relate to, in a cooperative manner, certain other units. These include the Admissions and Registrar's Office and the Office of Auxiliary Enterprises, which administers University Housing and the operation and program of the University Center.

Resource Management

Although long-term planning has been used at times in the past, budgetary realities and enrollment variations within the recent past have made annual planning the only practical way in which to manage resources. Each administrative unit prepares a proposed budget. These budgets are then assembled into a single budget proposal for the Student Affairs Division through the cooperative action of the head of each administrative unit and the Dean.

The budget is prepared on a program budgeting system that is based on guidelines furnished by the National Center for Higher Education Management systems

of the Western Inter-State Commission on Higher Education. Each program element is supported by program measures that show the results obtained from the resources allocated to each element.

Personnel vacancies are filled through standard procedures and in conjunction with the campus Personnel Office. All Equal Employment Opportunity regulations are observed in the hiring process.

Affirmative Action

The Student Affairs Division has a goal of increasing minority representation. Although some progress has been made, the combination of very limited hiring during the past several years and the very small number of minority representatives among those who apply for the few vacancies that do occur serve to prevent rapid changes in the number of minority staff members.

The enrollment of both minority and women students has been increased through two programs specifically designed as affirmative actions. Both programs involve some University support but receive significant financing from private donors. Both programs are supervised by the Counseling and Testing Center, from which full details are available.

Dean of Student Affairs Office

The Dean of Student Affairs Office is responsible to the Chancellor for the administration of student affairs. It must maintain a liaison with other campus divisions and faculty on related matters. Its major function is to communicate with students, student organizations, and elected representatives of the student body. This is accomplished either directly or indirectly through members of the Student Affairs staff. The supervision of the budgeting and expenditure of the funds secured from the Student Activity Fee is also a responsibility of the office.

Band

This musical activity is actually broad in scope and involves not only several bands but an orchestra, two choirs, and a musical theatre activity designed for non-music majors. The program has grown steadily over an 18-year period from one band and a glee club to 13 formally organized musical groups and a number of informal groups that provide experience in the performance of music for students with varied interests. These various musical groups present about one hundred performances yearly to a cumulative live audience of at least a million persons. The quality of the music is high, and the groups are much in demand, receiving numerous invitations to major events throughout the Nation.

The program which started in 1960 with eight members, now has 400 active participants indicating that enrollment in musical activities is at an all-time high. UMR's musical fraternity and sorority hold many national awards. Some groups (for academic credit) are faculty directed whereas others are student directed and managed by a faculty advisor.

Service to the high schools within the immediate area is included in the department's activities. Several thousand high school musicians in this area are brought to campus each year for various clinics and festivals.

Two full-time and two part-time staff members are responsible for the music programs. Each full-time staff member devotes one-half time to the Band program and one-half time to the teaching of music courses in the College of Arts and Sciences.

Extracurricular Intellectual and Cultural Activities

During the period of 1967-70, the General Lectures Committee of the Student Council and the Fine Arts Committee of the Student Union Board presented more than 30 professional events each year on campus. These ranged from speakers to performances by symphony orchestras and opera companies . It was a time of general student hostility to anything "regular" or connected with the establishment. For a variety of reasons the scope of the program was curbed.

At present there is still a reduced and inadequate program. The lack of a suitable facility, i.e., an auditorium, is one of the principal factors. For large productions (professional theatre, symphony, ballet, and opera), a paying audience is necessary, and an audience cannot be expected to pay for admission to a facility that provides poor seating, acoustical properties, and stage and lighting conditions. This was learned the hard way during the 1967-70 period. A properly furnished auditorium should be an integral part of a campus of UMR's magnitude.

Cooperative Program Office

The Co-op Program Office is administered by one full-time Director and one full-time secretary. Faculty members are involved as academic advisors to Co-op students. The functions of the office are: 1) to provide opportunities for undergraduate and graduate students to obtain professional industrial experience while pursuing their academic programs, 2) to prepare graduates for immediate professional assignments without further on-the-job training, 3) to provide closer contacts for various employers, the university, and students, 4) to facilitate the means whereby employers can further the professional education of qualified, prospective employees for all or many of the phases of their organizations, and 5) to provide financial assistance for the students. These functions are fulfilled in the following manner:

1. *High* school and transfer students are contacted personally, through the mail or their advisors, or during campus orientation and open house programs.

2. Prospective employers are contacted personally either at their plants or on campus or through written communication.

3. Co-op employment interviews are arranged when employers are recruiting on campus or when they can be reached at their place of business.

4. The work-school schedules are coordinated by registering all the students for each work period and preregistering all the working students for the next school period.

5. The Co-op students are counseled on campus during school periods as well as when they are working.

6. Close contact is maintained with other UMR offices: Admissions and Registrar, Counseling, Placement, Financial Aids, and academic departments.

7. General office procedures are handled through records, correspondance, and communication.

Present statistics indicate that approximately 400 students are employed by approximately 125 companies or agencies.

Another activity includes serving on national committees in the Cooperative Education Association. This has required that the Director serve as Local Arrangements Chairman for the 1975, St. Louis, Missouri, meeting and for the 1976, New Orleans, Louisiana, International Cooperative Education Annual Conference.

Counseling and Testing

UMR's Counseling and Testing Center was established in 1968 to service the students and the University community. Its objectives are to provide professional counseling services to aid in the solution of educational, vocational, and personal problems.

The Center, which is adequately housed in the Rolla Building, has four doctoral level counselors who devote 3.50 FTE to counseling and testing activities. Their objectives are implemented through the following activities:

Counseling. Through individual and group contacts, the counselors attempt to provide an atmosphere in which each student can feel free to discuss his concerns in utmost confidentiality. In this way, the counselors help the students to understand themselves better and become what they want and are able to be. Every effort is made to make all pertinent resources available to aid the students in their problem-solving efforts.

Testing. Tests are best used as a part of an overall counseling experience. Arrangements are made to explore the use of interests, personality, or ability tests in providing supplemental information to students.

Tutorial Assistance. Veterans who desire tutorial assistance under the G.I. Bill make arrangements for this assistance through the Center. A limited number of non-veteran students also receive tutorial assistance within the limits of the availability of work-study tutors.

Referrals. The Center helps in making referrals as needed. These referrals are made both to campus and off-campus sources.

Advisor Coordination and Training. Under the direction of the Provost/Dean of Faculties, the Center is currently coordinating the UMR Freshmen Advising Program. In addition, in-service training for the advisors has been directed by the Center.

Consulting. The Center offers consulting services to various groups on campus. These activities have been directed primarily toward the enhancement of educational experiences of various groups, such as live-in dormitories and fraternities.

Summer Preregistration and Orientation. The Center coordinates this program, which is designed to aid prospective students in beginning their higher educational experience in the most appropriate way.

Developmental Reading Program. This program is designed to increase reading efficiency by improving reading speed and comprehension.

Extension Activities. Each year the counselors are involved in many extension programs. In the 1975-1976 year, these activities included the Predischarge Education Program, non-credit courses, and the Minority Engineering Program.

Two special programs related to the Counseling Center are the Minority and Women in Engineering Programs. Administrative leadership, counseling assistance, and physical facilities are provided for these programs, which initially evolved from previous counseling efforts.

Placement Service

It is estimated that 663 baccalaureate, 125 master, and 15 doctoral degree holding students will be seeking placement upon graduating from UMR in 1977-78. All of the individuals receiving these degrees will be served in one or more ways by the UMR Placement Service. Approximately 490 business and industrial firms or governmental agencies have scheduled campus interviews for one or more visits to

UMR during the current school year. Complete company information files on these organizations are maintained in the Placement Office library. During the past academic year, approximately 8500 interviews were conducted by 855 company representatives in the UMR Placement Service facilities.

Placement Service is an activity, which is organized with appropriate staff and facilities to serve not only UMR students and alumni but industry, business, Government, the University, and its administrators and faculty. The Placement Service office is considered to be industry's "open door" to the UMR campus. The office's administration and operation constantly reflect this philosophy.

Student and graduate job placement has been an integral part of the services provided by UMR administrators for the students and alumni for many years. Their maintenance of an active liaison and relationship with industrial firms, service organizations, and governmental agencies has been such that an adequate campus interview program has become well established for both summer and permanent employment opportunities for UMR students. Furthermore, the Service now utilizes its industrial liaison to provide similar services for UMR alumni. Channels of communication are maintained between industrial representatives and University administrators and faculty, so that all possible relevant information can be fully exchanged.

During recent years, the UMR Placement Service has assumed an increasing responsibility for the career guidance and vocational advisement of the students. The need for this activity is most acute in the Liberal Arts area, which has experienced a substantial increase in enrollment over the past five years. The Director has taught an experimental non-credit course in Career Planning and Vocational Choice, which is designed specifically for Liberal Arts majors.

The Placement Service office is located in the Buehler Building on the corner of 9th and Rolla Streets, three blocks from the main campus. The office space of 12,500 square feet is subdivided into a reception clerical area, Director's office, recruiter's lounge, placement library, interview sign up areas, and 28 interview rooms. The staff comprises the Director and three administrative or clerical assistants.

A long history of maintaining close relationships with both employers and students in a professional manner is an important strength of the office. The superior quality of the office space and the arrangement of that space are strong supportive factors, but the location of the facility away from the campus and lack of sufficient personnel are notable weaknesses.

Student Financial Aid Office

Despite the current rise in all operating costs, UMR can still provide an outstanding professional education in engineering or science at costs within the reach of the middle income family. Many of UMR's students who come from such families can hold their ex-

penses to about $3,000 per year and thereby lighten their parents' expenditure load. Others, in spite of a normal schedule of 15 to 17 semester hours, can finance much of their costs through their own efforts and through various methods of financial assistance. The Work-Study program is a primary source of assistance. Students who work part-time may carry a lighter schedule than their nonworking peers and still qualify for loan and scholarship aid. Married students receive help from working wives, many of whom find on-campus employment. Also, there are several types of student financial assistant that can be obtained through the Student Financial Aid Office.

Of concern to this office has been the limited number of available fund types, specifically scholarship funds, that have minimal restrictive criteria for awarding, but this situation has been improved since the last evaluation. The Alumni Association has increased the number of unrestricted scholarships that can be offered, and, as a result of a cooperative arrangement with the Association, funds are being solicited to increase the number of such scholarships.

Contact with scholarship donors consists primarily of informing them about the grade reports of scholarship recipients and advising the donors about the selection of those recipients. In recent years, these contacts have been significantly improved through the cooperative efforts of the Development Office. Coordination between the Development Office and the Student Financial Aid Office is very close. The former advises the latter of any preliminary contact made by a potential scholarship donor. The Aid Office sends old files and/or scholarships that donors have allowed to lapse to the Development Office, and the latter contacts those who have submitted inquiries about the possibility of establishing scholarship programs at UMR.

The staff of the Student Financial Aid Office has been increased by the addition of an assistant director, but the mounting complexity of the aid programs still infringes on the time that can be spent with the students. The necessity of satisfying the regulatory requirements of internal, Federal, and State student financial aid programs makes the current shortage of secretarial and clerical support in the office an acute problem. Administration in recognition of this difficulty has assigned an employee to the office to assist in the paper work.

Student Health Service

The facilities of the Student Health Service are located in the UMR Infirmary on State Street at the west edge of the campus. The professional staff consists of full-time registered nurses and part-time physicians. The infirmary performs all necessary medical services except major operations, for which the nearby Phelps County Hospital is available.

Physical examinations are required of all students. This requirement includes chest X-rays or Tine tests, immunizations, and physical examinations. No exemptions from this requirement are permitted. The Admission Physical Form must be completed

The athletic program is financed by a student activity fee, which is paid by the students, income from football and basketball games, and the sale of programs and concessions. Each MIAA conference participant is required to prepare a financial report at the end of the academic year and to list the expenditures of its various sports. This report is sent to the commissioner and conference members. Also, each semester, a list of young men who receive athletic grants-in-aid is exchanged and filed with the commissioner. This list includes the amount paid to each man. Each school can spend no more on athletic grants-in-aids than 57 times the normal student costs of fees, books, and room.

The women's program can be financed by the Student Activity Fee and subsidized by other University income. Each school is required to report athletic scholarship recipients by name and by the amount each receives annually. UMR is limited to 12 scholarships in basketball, 27 in football, and 12 in volleyball. The total amount of aid any one recipient may receive is limited to the cost of tuition, fees, room,and board, although the amount may be less than that total. Regardless of the amount any recipient receives, the amount of the grant to the individual is considered one full scholarship.

The UMR Golf Course is under the supervision of the Director of Athletics. The course is operated basically for the recreational use of the students. Over 11,000 rounds of golf were played last year. The course is financed by student fees, green fees, and sales from the golf shop.

Intramural sports, for all practical purposes, play the major role in the Physical Education program. Every student is given an opportunity to take part in some form of organized sport. The program, which includes 21 different sports, attempts to develop team and individual competition, greater interest in all sports, good fellowship, and fair play. It also provides an outlet for social recreation.

This program reaches a majority of the students. This can be verified by the more than 2500 who participate in the program; however, more outdoor and indoor facilities are needed.

Other phases of the program include instruction on a voluntary basis in: swimming (from beginner swimming through water safety instructor), golf, tennis, gymnastics, wrestling, badminton, handball, archery, riflery, and all major or team sports. Instruction and recreational programs are provided for the faculty and their families. First aid instruction is also offered.

Provision for Student Participation in Governance

Student Council. The Student Council is the official organization for student government for undergraduate students and serves as the official means of communication between undergraduate students, the faculty, and the administrators of UMR. The duties and powers of the Student Council are stated in the Manual of Information, a booklet which is available to any student at his request.

In practice, the Student Council functions quite effectively, both in student governance and in relations with UMR's faculty and administrators. Three faculty members are elected by the Council to serve as council advisors.

Under the Bylaws of the Faculty, students have membership in the Academic Council. The student representatives are selected by the Student Council. The representatives may be members of the Student Council but are not required to be.

Graduate Student Association. The primary purpose of the Graudate Student Association is to promote the general welfare of the graduate student. It provides the graduate student access to administrative channels and ensures representation of graduate needs in the political arena that cannot be obtained through the Student Council.

Under the Bylaws of the Faculty, students with membership in the Graduate Student Association are appointed as representatives on the Academic Council and other various committees.

Student Union Board. The Student Union Board officially directs the activities of the Student Union's social and recreational program as well as the expenditures from funds allocated for that purpose from student fees. The Board is perpetuated by election of a succeeding Board by the membership of the existing Board. A description of the Student Union Board and its functions are included in the Manual of Information.

A full-time Program Coordinator works with the Student Union Board in all phases of the programming activities.

Faculty Committees. Faculty committees in most areas include students as voting members. The committees concerned with curriculum, research, and the selection and retention of faculty members do not have student members. A total of 14 committees have 38 student members. Student members are appointed by the Chancellor, who may, and usually does, follow the recommendations of the President of the Student Council. Student members on Committees of the Academic Council are appointed by the Student Council and the Graduate Student Association.

The President and Vice-President of the Student Council, the editor of the school newspaper, and the manager of the campus radio station may attend meetings of the faculty. They have no vote, but the Student Council officers may speak on matters of concern to students if they request them to do so. Their opinions are sometimes requested on matters even when the students have not asked to express those opinions.

Board of Trustees for Student Publications. The Board of Trustees for Student Publications is an organization of faculty, students, and administrators who resolve questions concerning the operations of the student newspaper, yearbook, and radio station.

BUSINESS OFFICE OPERATIONS

The business, fiscal, and physical plant operations on the campus are supervised by the Business Officer and his staff, which consists of an Assistant Business Officer, Administrative Secretary, and Secretary. The functions in support of business and physical operations are Budget and Records, Finance, Personnel, Physical Plant, Purchasing, University Police, and Auxiliary Enterprises. The primary supervision for Budget and Records, Finance, and Personnel is assigned to the Assistant Business Officer.

The operating budget of the campus reflects an operation of approximately $22,000,000 per year, which supports the educational pursuits of 4800 students and includes research and extension activities. The campus consists of 83 buildings located on 258 acres. The values of these assets are listed in Table 19.

Table 19

Values of UMR Assets

Land		$ 1,179,534.41
Buildings		32,890,574.45
Improvements Other Than Buildings		4,029,673.34
Equipment		14,058,381.24
Equipment Inventory	$11,904,181.86	
Library Cost of Books	$ 2,154,199.38	
TOTAL as of June 30, 1977		$52,158,163.44

Budget and Records

This function involves the preparation of the annual Legislative Budget and the annual Operating Budget, the implementation, coordination, and control of the Operating Budget, the operation of the campus Staff Records Office, and the preparation of numerous reports and statistical compilations.

A self-appraisal would contain the following strengths: 1) centralization of records and 2) maximum control over official records and documents to revise those records. The weakness of the function is the concentration of activities necessary to accomplish control.

Finance

This function involves the four basic activities of accounting, payroll, cashier, and accounts receivable. Accounting is jointly handled with the central accounting office as is payroll; however, the functions of the cashier and the accounts receivable are more nearly categorized as local activities.

Personnel

This function involves the normal administration of personnel responsibilities plus safety and building inspection in connection with safety. The strength of the operation is reflected in a strong classification system with salary and wage determination and control.

Physical Plant

This function involves the normal maintenance and operation of physical facilities plus allied support operations such as minor construction, utility plants, and vehicular operation. The strength of this operation is reflected by the unique expertise available locally. The weakness is the inability to administer certain minor construction by University forces and/or contract.

Purchasing

This function involves the procurement, inventory, and disposal of all University property. The activities are highly controlled; therefore, generally the operation is inflexible. The strengths are wide latitude in purchasing and central receiving. The weakness is the inventory control to include administration of surplus material, equipment, and machinery.

University Police

The police are responsible to the governing officials of the University for the administration of program compatible with appropriate State, Federal, and campus regulations to assure protection for the entire University community. Cooperation with local law enforcement agencies is required. The strength is in the caliber of UMR students. The weakness, if any, is UMR's inability to relate to local desires regarding level of law enforcement.

Auxiliary Enterprises

This function entails the centralized operation of all activities covered by bonded indebtedness on the campus. The activities include the operation of dormitories, cafeterias, married student housing, and University Center. The combining of bonds in these activities present special problems that can be coordinated to the best advantage by one office. The strength of this operation is span of control and fiscal integrity. The weakness of the system is the inability to balance expenses with the resources generated.

OFFICE OF EXTERNAL AFFAIRS

In November of 1975, the offices of Alumni, Development, and Public Information were combined to form the Office of External Affairs. It is headed by an executive director who reports directly to the Chancellor and is responsible for the direction of the three offices and for the planning and implementation of an expanding development effort. The position is currently filled on a part-time basis by the Chairman of the Department of Engineering Management.

The Office of Alumni Activities on the Rolla campus develops and coordinates a program interfacing 22,000 alumni and the University. Through its programs of information and cultivation, it encourages the continuing interest of the alumni in the educational development of the campus. While reporting internally to the Executive Director of External Affairs, it reports externally to the officers and directors of the MSM/UMR Alumni Association.

The Alumni Office is unique within the University, for until 1966 the alumni paid all expenses of the professional staff and for all equipment and activities. Currently, the University furnishes the salary for clerical and professional personnel and provides office space and a modest expense and equipment budget. Nevertheless, alumni contributions finance over 50% of the total annual budget. All travel and cultivation expenses connected with alumni activities are financed by alumni gifts. Further, they have purchased major items of office equipment, supported scholarships, grants-in-aid, work-study programs, and supplied discretionary funds for administrative offices.

Over 150,000 pieces of mail are processed by the Alumni Office each year. These include the Alumnus, solicitation letters, invitations, and responses to requests for information that come from alumni, employers, faculty, and administrators. The alumni magazine, which has an annual circulation of 60,000 copies and six issues, is the primary means of communication with alumni. Through its pages, enrollment is reported and encouraged, personnel appointments are announced, and programs are explained. Invitations are issued to area meetings of alumni and to alumni meetings held in conjunction with professional society meetings.

The Development Office is charged with providing sustained programs of involvement among the various constituent "friends" of the University. The ultimate goal of this involvement and information effort is to increase funds for campus needs, which cannot be provided for by public funds. Friends include all publics: alumni, businesses, industries, communities, individual nonalumni, university families, foundations, parents, and students.

The campus has not in the past had a comparable development activity directed toward this broad constituency. For the past few years, private giving has been of the order of $850,000, primarily from corporations. National patterns show corporate giving to be between 15 and 20% of the total; therefore, in order to increase corporate giving as well as develop support from alumni and friends, it seemed appropriate to organize to achieve this goal. In 1976, an integrated development program was launched to seek increased support

from corporations, foundations, alumni, and friends through deferred giving, major gifts, and annual giving. A case for support was developed upon UMR's unique ability to provide engineers and scientists to assist in solving critical national problems related to energy, mineral resources, and the environment. This message, which was and is being sent to corporations, alumni, and friends, invites them to make investments to assure an adequate supply of engineers and scientists. The total effort is supported by a UMR Development Council, which has as its chairman an outstanding alumnus. By the end of fiscal 1977, this increased effort brought private giving to the $1,000,000 level.

In addition to its external activities, the Development Office is responsible for the acknowledgement of all gifts, record-keeping of pledges, maintenance of deferred gift agreement records, and the periodic recording of university gifts. Publications related to the development effort are also included in the responsibilities of the development staff.

The Office of Public Information provides the campus with comprehensive services in the following areas: mass media information dissemination (both printed and electronic), publications, graphics (including photography), typography, design and technical drawing, and printing.

Information dissemination involves the preparation and distribution of news releases of all types of occurrences on campus, whether they relate to student, faculty, or staff. The material is provided for external mass and specialized media as well as internal communication outlets. In the publication and graphics area, the office provides assistance to faculty, students, and staff for all types of publications and graphics. In printing, the office produces a variety of printed matter from large brochures, such as catalogs, to business forms. It also services the campus with a centralized quick-copy reproduction center. Maximum support is given to the development operation through the preparation of development pieces and the creation of the desired campus image for various publics.

The coordination of these three important units under the direction of the Office of External Affairs has proven to be extremely beneficial. It has made it possible to bring a concentrated effort to bear on the problem of presenting the message of the campus to those who can provide private support. It has also tended to provide a uniform image of the campus to all its constituency rather than a fragmented appearance as had been done in the past. The result of this can only inure to greater amounts of private funding as well as an improved stature of the campus in the eyes of its public.

CENTERS AND INSTITUTES

ROCK MECHANICS AND EXPLOSIVES RESEARCH CENTER

Mission

The Rock Mechanics and Explosives Research Center was founded in 1964 as a multidisciplinary research group to solve problems associated with rock mechanics, particularly as those problems relate to ground excavation, movement, and support underground in combination with the developmental use of explosives. The Center's staff responds to the short-term solution of problems faced by those working in rock and to the long-term development of programs that are of ultimate benefit to the community.

History

Prior to 1964, the Department of Mining Engineering had developed several diversified research programs in rock mechanics and explosives in conjunction with mining and military problems. With further development and application, the thermohydrodynamics of detonation, the knowledge of the physics of shock waves, and the chemistry of equilibria and thermodynamics became an essential part of the technology of explosives. The science and engineering of explosives and rock mechanics then emerged as subjects of major interest in civil engineering, geological engineering, geophysics, geology, and other areas of science and engineering. Hence, a multidisciplinary approach to the solution of research problems was chosen as the most potentially productive means of investigation in the research areas involved. In 1964, a Rock Mechanics and Explosives Research Center was organized to accomplish this purpose.

Function and Organization

The academic disciplines participating in the Center include Engineering Mechanics, Geology and Geophysics, Mechanical Engineering, and Mining Engineering with support from Geological Engineering. The administration of the Center is provided by a Director who is aided and counseled by Senior Research Investigators. There are five Senior Research Investigators, one from each of the participating departments. Each Senior Investigator represents his department within the Center. On the average, each Senior Investigator teaches one course per semester in his department. Graduate research instruction (490 research) is taught on a regular basis by all staff members. Students supported within the Center and from the departments are encouraged to interact with Center staff. All research equipment in the Center is available to all students and staff members, although major items of equipment are normally the responsibility of one or two Senior Investigators. Although graduate research is performed in the Center, all graduate degrees are granted by the academic departments. Fiscal and personnel management is mainly the responsibility of the Director. Senior Investigators manage their own external grants, with the aid of the Director and the University Grants and Contracts Office.

The Center's personnel consists of 7 professorial staff (1 from Engineering Mechanics, 3 from Mining Engineering, 2 from Mechanical Engineering, 1 from Geology and Geophysics),

9 full-time machinists and electronics personnel; 4 clerks and typists, and 20 graduate and student assistants.

Measures of Productivity

The measure of productivity is difficult to average because there is a drastic fluctuation in funding levels. This can be illustrated by the fact that up until about two years ago external funding averaged $250,000. It then rose to $860,000 and is now settling back to $500,000 for the current year.

The Center's staff produces an average of 20 publications per year and supervises the theses of about five graduate students annually.

Strengths and Concerns

One of the major strengths of the Center is the effectiveness with which its multidisciplinary staff contributes to the total program. One area of specific research competence is the area of high pressure jet cutting in geologic material. At the present time, the expertise and equipment available at the Center marks it as the preeminent research establishment in this field in the free world. The Center also holds authoritative positions in the areas of wave motion through rock (such as is generated by blasting waves), the chemistry of explosives, and the support of underground openings. The Center's major concern at the present time is the lack of high cost capital equipment required for physical property determinations. Shortages of faculty and support staff to maintain the position of the Center is a troublesome factor that is currently being worked out by the University administrators.

GRADUATE CENTER FOR MATERIALS RESEARCH

Mission

The mission of the Center is education. This mission is carried out by the direct involvement of students in advanced research projects. The projects are supervised by Senior and Associate Investigators, who are professors associated with the departments of Ceramic, Chemical, and Metallurgical Engineering, Chemistry, and Physics. Interdisciplinary research and education are encouraged.

History

The Center was founded in 1964. The first Director was Dr. William J. James, who served until September 1, 1975. The present Director is Dr. Leonard L. Levenson. Initially, the Center was one of two research centers within the Space Sciences Research Center (SSRC). The SSRC was funded by the University of Missouri central administration. The Center was transferred from UM central administration operations to campus operations in 1970.

Function and Organization

The internal affairs of the Center are governed by the Director with the aid and counsel of the Senior Research Investigators. There are five Senior Research Investigators, one from each of the departments listed above. Each Senior Investigator represents his department within the Center. On the average, each Senior Investigator teaches one course per semester in his department. Graduate research instruction (490 research) is taught on a regular basis by all staff members. Students supported within the Center and from the departments are encouraged to interact with the Center's staff. All research equipment in the Center is available to all students and staff members, although major items of equipment are normally the responsibility of one or two Senior Investigators. Although graduate research is performed in the Center, all graduate degrees are granted by the academic departments. Fiscal and personnel management is mainly the responsibility of the Director. Senior Research Investigators manage their own external grants, with the aid of the Director and the University Grants and Contracts Office.

Measures of Productivity

Between 1973 and 1977 the average rate of external funding expenditures was about $47,000 per Senior Investigator per year.

Between 1972 and 1977 the average number of publications per year per Senior Investigator was about four.

Between 1972 and 1977 the average number of graduate students completing theses annually was about ten.

Strengths and Concerns

The strengths are several. The Center enjoys a national reputation in the field of materials research and international recognition through cooperative research exchange programs with the Laboratorie d' Magnetisme, CNRS, Grenoble, France and the Tohuku University of Sendai, Japan. Students and staff are constantly exposed to the ideas and methods of other disciplines. Summer support for students and senior staff provides continuity of effort. Funds for special equipment allow for some movement of research into new areas. Student contact with both basic and applied research problems broadens their educational base.

A concern in the Center is the inability of the present special equipment funding to provide adequate equipment replacements, although UM central administration has recently recognized this problem as a priority item. Another concern is the salary base for the senior staff. This base is generally below the national average for faculty of equal competence, experience, and productivity. These concerns are generally shared by all other units in the University.

GRADUATE CENTER FOR CLOUD PHYSICS RESEARCH

Statement of Mission

Because the Graduate Center for Cloud Physics Research is an integral part of the University, its primary function is to provide effective internships for science and engineering graduate students. Because they are separated from the purely departmental environment, the participating students and faculty work in a truly cooperative interdisciplinary relationship on problems that relate to the science and technology of cloud physics and atmospheric pollution. The primary scientific objective of the Center is to contribute to man's understanding of the atmosphere and its processes. The Center's specific area of specialization deals with the search for how airborne particulates regulate cloud formation and precipitation processes.

History

The Center was founded on a trial basis in 1966. Within two years, it acquired full center status with Dr. James L. Kassner, Jr. as director. Several years were required to establish the present conditions of scientific and technical strengths. To a large extent, this occurred between 1968 and 1972, during the period of the Center's THEMIS contract. This contract provided the main base for the reputation the Center now enjoys. A selection of basic courses in cloud physics and aerosol and environmental science provide an opportunity for the researcher-teachers to bring up-to-date information into the classroom. These courses are fairly well dispersed among the participating departments. The Center has developed a close working relationship between theorists and experimentalists. This has provided a strong base for the highly coordinated research program, which today is recognized as one of its major strengths. The Center's special contribution to atmospheric science lies in its ability to bring a high level of basic chemistry, physics, and engineering expertise to the development of an understanding of aerosol and microphysical processes that supports the broader development of meteorology. The Center's record is one of steady progress in this direction.

The Center was originally under the cognizance of Dr. Theodore J. Planje, Dean of the School of Mines and Metallurgy. In September 1975, Dr. Adrian H. Daane, Dean of the School of Arts and Sciences, assumed this responsibility.

Organization

The Center's Executive Committee, which is composed of the Director and senior investigators, makes decisions concerning the research activity of the Center. The committee meetings usually include the research associates from the departments and the research professors. The Steering Committee, which is composed of the deans and department chairmen, reviews the general progress and management of the Center each year. The Office of the Graduate Dean is assigned the task of performing a periodic review of all research centers.

The Center comprises five senior investigators, five research associates, four research professors, three research aides, one research engineer, one laboratory mechanic, 13 graduate research assistants, and a number of undergraduate research assistants. The departments of Physics, Chemistry, Computer Science, Mechanical and Aerospace Engineering, Electrical Engineering, and Engineering Mechancis participate in Center activities.

Measures of Productivity

Probably the best measure of the Center's productivity is outside funding. It reflects the acceptance of its research program by the investigator's peers in the scientific community and the program monitors in the Federal agencies. The Center has about a dozen different contracts, which are rather well distributed among the staff. These contracts involve the following agencies: NSF, NASA, ONR, ARO, USRA, and NCAR. Approximately 40 papers have been published in the years between 1975 and 1977. Twenty-two doctoral and 23 masters degrees have been awarded to students whose research was carried out within the Center since its inception. Innumerable undergraduate students have obtained some meaningful experience in their professional areas and worthwhile remuneration as a result of working with the Center's staff.

The Center's staff members are widely known throughout the scientific community in this country and abroad as verified by their participation in national and international meetings and committees.

Strengths and Concerns

The Center's primary strength lies in its energetic and hard working staff members. They effectively pool their intellectual backgrounds and capabilities and exchange ideas and information freely. The degree of coordination and interdependence between the various projects is an asset to the staff members who are not trained in meteorology.

It has been difficult to coordinate a rudimentary educational program with the research efforts. Although the Center's interdisciplinary approach is a great asset, the fact that it is not associated with an on-going meteorological program has been a minor but persistent hinderance.

CENTER FOR INTERNATIONAL PROGRAMS AND STUDIES

The Center for International Programs and Studies (CIPAS) was established in 1968 at UMR to provide programs of educational service, research, and training to interested countries with special technical needs. Since that time, several projects developed by CIPAS have been activated and/or brought to fruition, and several are presently pending.

Organizational Structure

CIPAS reports to the Provost/Dean of Faculties. A director, associate director, administrative associate, and necessary support staff carry out the international programs.

In addition, the multidisciplinary orientation of CIPAS is assured by the appointment of center associates who are assigned on a time-sharing basis to engage in research or to participate in other activities. The administrative staff and an advisory committee of faculty members (Committee on International Programs and Studies) constitute the decision-making body of the Center to assist with the development of CIPAS activities.

International Faculty Teaching Projects

A current project involves the development of and teaching in an Electrical Engineering Institute in Algeria. In addition to on-site faculty assignments related to development and teaching, faculty project involvement includes work by on-campus personnel related to curriculum structure, course development, and writing of laboratory experiments. The duration of the contracts is expected to be between eight to ten years, with an initial contract of three years. The funding source is the Educational Development Center (EDC), which has provided an initial funding level of $226,385 for three years.

A previous University project (1969-1975) dealt with the development of an engineering university in Saigon, Vietnam (Phy Tho). Funded by USAID, the project entailed faculty teaching assignments in Vietnam. Off-campus expertise was solicited and used to fulfill project commitments. The project was funded for $1,621,000.

International Laboratory Development

Two separate projects for laboratory development in the areas of electrical engineering and petroleum engineering were provided for the Escuela Superior Politecnica del Litoral during 1975 and 1977-78. This project provides guidance on and acquisition of laboratory equipment, writing and on-site demonstration of laboratory experiments, and the on-site supervision of equipment installation. It is funded by the Inter-American Development Bank for $10,138 and $15,000 respectively.

Short Courses and Seminars

Short courses in Belo Horizonte, Brazil, on "Power Apparatus Testing Techniques" have been held in 1974, 1975, and one is currently being planned for 1978. Staffed by a UMR director and three industrial lecturers, this course is held in cooperation with the Federal University of Minas Gerais and the A. B. Chance Company. This course has been highly successful and is supported by course participants. Its funding level is $23,000/year.

A series of five seminars were conducted in Belem, Para, Brazil, between 1973 and 1975. The general topics included hydrological engineering applications, analysis and control techniques of water systems, theory and application of regional mineral exploration, exploration and evaluation of the mineral prospect, and the inventory and evaluation of forest resources. It was funded by USAID for $86,400.

A research seminar on "Computer Methods of Power System Analysis and Control" was held in Bucharest, Romania, during 1975. It was funded by NSF for $13,600.

A short course series is being conducted by UMR in cooperation with the National Rural Electric Cooperative Association (NRECA) in the area of system distribution. The course is staffed by UMR professors with assistance from outside consultants. The course is funded by the participants for $17,000.

International Student Training

A current CIPAS grant will provide M.S. and Ph.D. training to Algerian students. Tied to the teaching project (see International Faculty Teaching Projects), this program will train Algerians for faculty assignments in the electrical engineering program being instituted. Ultimately, these graduates will replace U.S. faculty in the institute. EDC will provide the funds on a basis determined by the number of students.

National and International Contacts

CIPAS maintains liaison with Federal agencies and industrial concerns having mutual interests. It further solicits information on projects involving international activities, e.g., it subscribes to and follows up on a federally-sponsored program, which receives bid requests from foreign agencies for project needs.

Conclusion

CIPAS was designed to meet the problems of implementation and administration of programs that may involve long or short periods of service abroad in multidisciplinary areas from the University of Missouri faculty and staff. Educational, technological,

economic, and social development problems continue to challenge the countries of the world. UMR, with its traditional concern for fundamental and long-range problem solving, will continue to take the initiative in expanding its resources for assisting interested countries in solving educational and technological problems.

CIPAS will respond to requests to analyze and report on specific problems. Such activities are undertaken only when they significantly support a research or education priority of the University. The host agency, of necessity, arranges financing for assistance activities or suggests sources of funds otherwise acceptable to CIPAS.

ENVIRONMENTAL RESEARCH CENTER

Mission

The Environmental Research Center's principal concerns are man's relationship to his environment and how engineers and scientists of related disciplines can make the environment best suit the needs of man. The missions of the Center, therefore, are to promote, foster, and coordinate interdisciplinary studies of this relationship, to apply acquired knowledge to environmental health problems, and to educate students in the ways of environmental engineering.

History

The Center was established in 1965 with an initial staff authorization of 1.0 FTE. A director (0 FTE) was formally appointed in 1966, and two faculty members (each at 0.5 FTE) were added in 1967; all three had academic appointments in the Department of Civil Engineering. The Center's personnel, supported by appropriated funds, remained unchanged over the next eight years, although the total FTE was at times less than 1.0. In the academic year of 1975-76, all faculty FTE were transferred to the Engineering Research Laboratory. Since 1971, the Center has had the use of a 4000-square foot Environmental Control Laboratory in the Engineering Research Building.

Organization

Three faculty members, with academic appointments in the Department of Civil Engineering, have held part-time appointments in the Center. The Center has also had a close research and training relationship, although not a formal association, with the faculty members and students in several other departments, primarily Chemistry, Electrical Engineering, Geology and Geophysics, and Mining, Petroleum, and Geological Engineering. Further, project teams headed by the Center's staff have on several occasions successfully included researchers from other campuses of the University as well as from other universities. All faculty members associated with the Center teach at least one course each semester, and one additionally serves as the director of the Center for International Programs and Studies.

During the 1976-77 academic year, ten graduate, one second B.S., and five undergraduate students were supported through the Center by Federal and industrial funds. The disciplines represented by these students were chemistry-life science (3), civil engineering (11), computer science (1), and geology and geophysics(1).

Productivity

The research interests of the Center are in the areas of water pollution and abate-

ment, water management and protection, air pollution and abatement, and solid waste management. Federal and industrial research and training support generated by the Center during the last three fiscal years (1974-75 to 1976-77) has totaled $561,701, and currently the active support totals $241,530.

Scholarly contributions authored or coauthored by the Center's staff since 1966 total 139 and include 89 publications, 9 preprints and abstracts, 5 pending publications, 16 research reports, and 20 presentations. Contributions in 1977 totaled 14, including 7 publications, 5 publications pending, 1 research report, and 1 presentation.

Strengths and Concerns

The primary strength of the Center is its success in promoting, fostering, and coordinating research and training in the environmental health engineering area, be it multi-, inter- or unidisciplinary in character. This has been manifested through interdisciplinary grant activity, development of projects, which by choice remained solely under one academic department, cooperation in thesis and dissertation research, publication, and exchange of research equipment and instruments, and it is exemplified by the long-term investigation of environmental pollution by lead and other heavy metals from industrial development in the New Lead Belt of Southeastern Missouri, a project that has received world-wide attention.

A "built-in" concern is the limited faculty available to the Center and the lack of support staff (laboratory or clerical). The decreasing number of graduate students on campus has also had an impact on the Center.

CENTER FOR APPLIED ENGINEERING MANAGEMENT

In January 1978, UMR established a Center for Applied Engineering Management for Missouri industries that need assistance in coping with technical problems or making production or product changes.

Industries may request programs through the Center in the areas of:

Technology Transfer: In this program, technical information is obtained through literature searches and from the Office of Technology Assessment and Forecast of the U. S Patent and Trademark Office, Government agencies, the University of Missouri Library System, NTIS, and other information sources.

Energy: Energy computer analyses for industrial firms, energy auditing, and energy management workshops are provided.

Innovation Evaluation: Small manufacturing firms are provided with a computer feasibility evaluation of innovative ideas.

Outlook Information: Future outlook information needed by managers of small manufacturing firms for decision-making is developed on a regular basis.

Technical Assistance: Technical counseling is provided for firms having technical problems and to implement information furnished the firms from various sources.

The Center's staff works with firms requesting assistance in defining their needs. After determining the type of information required, the most effective means of responding is determined. Individual assistance is provided by faculty and students from various departments, which include Engineering Management, Civil Engineering, Mechanical and Aerospace Engineering, Social Sciences, and others that have the necessary expertise in both academic and industrial areas. Both graduate and undergraduate students are involved in the Center's activities and are under the supervision and direction of the Center's staff.

Because the Center has just been established, achievements to date consist mainly of organizational efforts, but it will provide a service that is frequently requested and greatly needed by Missouri firms.

TRANSPORTATION INSTITUTE

In 1967, a group of UMR faculty members from diverse disciplines voluntarily joined in a multidisciplinary effort to prepare a proposed project that would benefit the development of the Ozark Region. The group planned to develop a mathematical model of the region so that predictions could be made of the effects that would be wrought by the introduction of various resources. The model was all inclusive and contained contributions from a spectrum of disciplines in engineering, geology, mining, sociology, economy, psychology, biology, and religion. Although the proposal was not accepted, it provided the foundation for a new proposal that was submitted to and accepted by the Department of Transportation for the development of a Transportation Institute. The purpose of this organization is to foster research and education in a number of diverse socially applicable projects that may or may not relate directly to the specific requirements of transportation.

Generally, proposals on particular topics of interest have been generated by subgroups composed of faculty members and students who have direct interest in the subject matter Each of these smaller groups prepares the necessary proposal and designates one of its members as a project director, but each subgroup can call on the expertise of the entire Institute for assistance and criticism. From the very beginning, it was decided that the Institute would not become an administrative agency but would work through the departments. As a result, it does not appear as an item in the fiscal and financial reports.

The departments have assisted the Institute financially insofar as the projects relate directly to their funded missions of education and research. The support has been nominal but very helpful.

The following list of projects represents the work of the Transportation Institute. Each was processed through the respective department of the project director.

"A Study of Factors Affecting the Requirement for Construction of Highway Interchanges in Missouri", Missouri Highway Commission ($13,500).

"Traffic Planning and Control Short Courses for Municipal Officials", Missouri Department of Community Affairs and HUD ($9,500).

"Establishment of an Interdisciplinary Transportation Institute", U.S. Department of Transportation (DOT) ($75,000).

"A Socio-Economic Traffic Demand Prediction Model Based on a Lumped System Approach", DOT.*

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*Project partly funded by agency.

"Evaluation of City and Region Planning Techniques", DOT.*

"Journey to Work Studies", St. Louis, UMSL, UMR, DOT.*

"Pattonsburg-A New Town", Missouri Department of Community Affairs ($20,000).

"Simulation of Passing on Rural Two-Lane Highways", Missouri Highway Commission ($10,000).

"Right Turn on Red", Missouri Highway Commission ($10,000).

"Street and Roads Short Courses", Missouri Department of Community Affairs ($10,000).

"Driver-Vehicle Dynamic Guidance Systems and Simulation", AMC., GM DELCO, GE ($12,000).

"A Comprehensive Highway Safety Plan for Missouri", Missouri Highway Safety Commission ($12,000).

"Driver Performance Research Engineer", DOT ($26,000).

"Older Adults Transportation Service Evaluation", U.S. Department of Health Education and Welfare ($50,000).

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*Project partly funded by agency.

INSTITUTE OF RIVER STUDIES

An interest in water-related research under the auspices of the Department of Civil Engineering has been maintained for many years. In recent years, in response to a growing national and regional awareness of the vital importance of water resources, there has been an exponential expansion of interest in research relating to water resources and those environmental factors associated with it. This expansion of interest led to the formal establishment of the Institute of River Studies on January 1, 1976.

The specific objectives of the Institute as originally conceived are 1) to enhance the cooperative efforts of a broadly based interdisciplinary team which concentrates its attention on contemporary water resources problems to improve the efficiency, communication, and coordination of water research, 2) to promote the development of a broad, sophisticated, and expanding store of publications on water and water-related research, 3) to encourage communications among disciplines with respect to water and water-related research, 4) to foster expanded student participation in water and water-related research, and 5) to maintain a sound organizational and administrative structure to permit the Institute to expand in accordance with demand in an effort to achieve national recognition for the quality of its efforts and the broad spectrum of its capabilities.

To date the Institute has completed seven major studies. The total dollar amount involved is $126,038. At present, the Institute is engaged in four studies, whose total support amounts to $558,179. In addition, the Institute has three studies that are pending. The funds being sought amount to $167,511.

During the course of its existence, more than 150 students have participated directly in the study efforts of the Institute. Thus, it contributes to both the academic and research posture of the School of Engineering.

In 1977, the Institute received direct recognition for its efforts in the form of a commendation from the Corps of Engineers for outstanding achievement.

As national concerns deepen relative to water and water-related research, the future of the Institute appears to be extremely promising.

CONCLUSIONS

UMR has responded to the concerns of 1971 in a variety of ways. The Chancellor's Office now has but eight principal administrative officers reporting to it. Advisory roles have been shifted, and with the development of the Academic Council a much greater contribution is being made by the faculty. The function of the central administration has changed, and the campus administrators cooperate more efficiently than in the past with respective central administration officers. It has become easier to accept responsibility for decisions.

The appointment of a Dean of Student Affairs has elevated that function and has generally improved student-faculty communication, even though these relationships and the student-town relationships have been excellent in the past. UMR experienced little of the student unrest that so traumatically affected most other universities during the Viet Nam War, and its low dropout rate is the envy of other Missouri institutions of higher education. The quality of UMR's undergraduate students is excellent.

The quality of the graduate students on campus has improved dramatically since 1971. Partially because there is a slower turnover of students at the Graduate Engineering Center at St. Louis; the quality of its students as rated by standard academic measures has improved less rapidly but steadily. The continuing education and Master of Science needs at the Center have been separated with reasonable success. Whether this can be continued will depend heavily on the decisions of the accreditation agencies, i.e., North Central. The greatest problem confronting UMR in administering admissions is that students who have been rejected for an M.S. by UMR are being admitted either to another institution in greater St. Louis or to a Big 8 - Big 10 institution.

In spite of the continuing concern that UMR provide the greatest educational returns for its expenditures, it has indeed made major improvements since the last visitation. The appearance and comfort of the campus has been greatly improved, and the University Center has increased the morale of the students and staff. Major opportunities have been brought to the campus through the efforts of the faculties in the departments of Humanities and Social Sciences and have been taken advantage of by them. Enrollment is high, and the professional fields have abundant employment opportunities.

Research grant dollars per faculty FTE are the highest for any campus in the Missouri system. Publications per faculty reached an average of two during the past year from an earlier measure of 0.58. UMR's very real loss has been that its better faculty members have been moving to administrative positions in larger institutions.

Although the self-study deals primarily with UMR's current status, it references the three parts of the University Academic Plan that relate to the future relative to degree programs, research, and extension. Beyond the limited expansions reflected in these

plans, UMR projects no major change in function during the next six years, but if the needs of its clientele change with societal pressures, UMR will be mindful not only of the demographic projections but of the potentially new technological demands and will make both quantitative and qualitative changes in its educational programs.